# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXVIII. No. 2165.] LONDON, NOVEMBER 8, 1904. [56TH YEAR. PRICE 6d.



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— *ESTABLISHED 1830.* —

MANUFACTURERS AND CONTRACTORS, **ORMSIDE STREET, LONDON, S.E.**

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**SAFETY GAS-MAIN STOPPER,**

FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.

**GAS-LEAK INDICATOR.**

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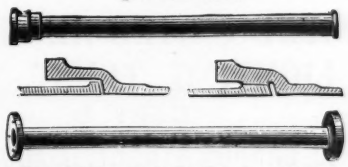
1½ to 12 in. BORE.



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**MELDRUM'S PATENT**

# RETORT SCURFER

**Saves its Cost many times each Year.**

TESTIMONIAL

*WRITE FOR FULL PARTICULARS.*

RESULTS GUARANTEED.

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GENTLEMEN,

We have now had your Retort Scurfer at these Works for over Twelve Months, and having tried several forms of de-scurfing Retorts, we have no hesitation in saying that it is by far the best Apparatus we have tried for this purpose. **Two men have several times drawn a Setting of Seven Retorts, thoroughly cleaned the same, and charged the Retorts again within 6½ hours.** As a matter of fact, it is unnecessary for a Retort to be out of use more than 40 minutes for scurfing purposes if your apparatus is used.

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# 1000 CANDLE POWER AT 1d. PER HOUR.

The Cheapest, Cleanest, and most Efficient Light upon the Market.

It is particularly adapted for Engineering Works, Foundries, Breweries, Dye Works, Collieries, Brick Works, and all large Shops and Spaces.

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Installations of from 500-Candle Power to any amount can be erected in one to four weeks according to size.

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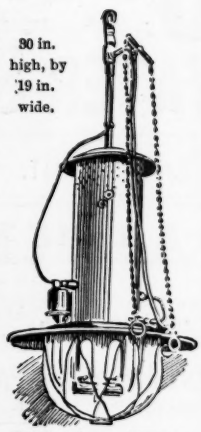

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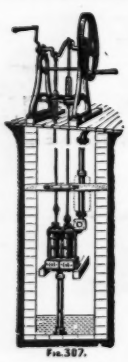

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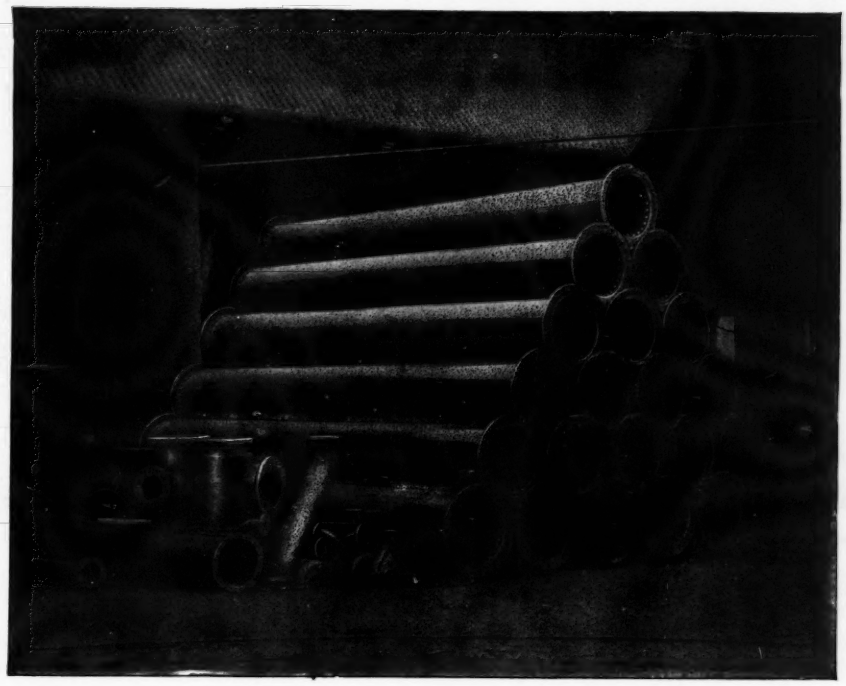

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6.—Smallest consumption of power.
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8.—May be set at any position in regard to height by either manual or motor power.
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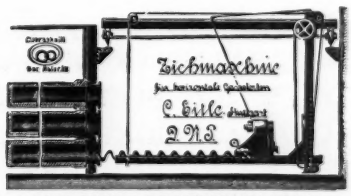


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### ADVANTAGES OF THE "SCHLANGE" DRAWING MACHINE

1.—The simplest and best drawing machine in the world for horizontal retorts.
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4.—Smallest consumption of power.
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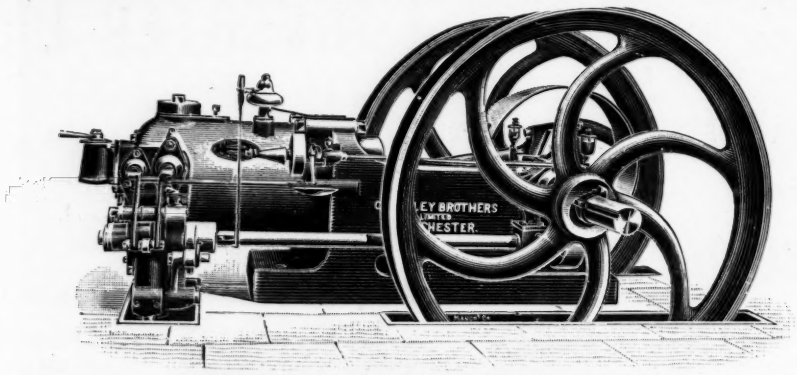
**SUITABLE FOR DRIVING EXHAUSTERS, PUMPS, &c.**




Represents "XA" Type giving 60 Effective Horse Power.

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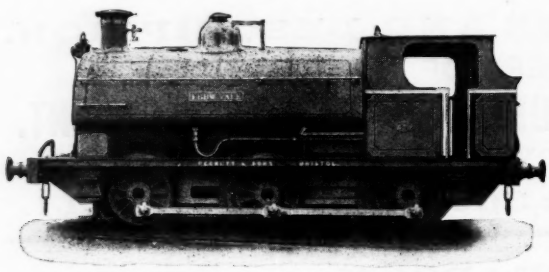

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Scoops supplied with or without handles, and of any dimensions or shape required.

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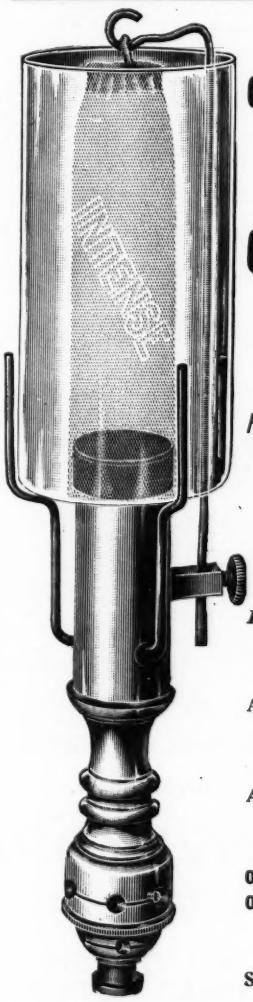

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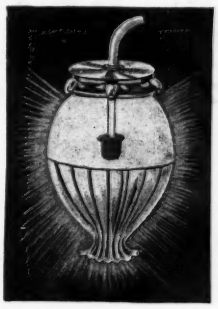

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BURNERS, 3s. 9d.
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Consumes only 2½ cubic feet of Gas per hour.
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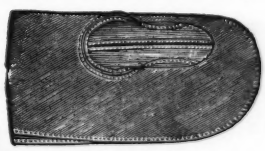

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STOKERS' MITTS.
Made from best Tanned Leather.

India-rubber Goods of every description. Leather Bands Oils, &c., Diving and Wading Dresses, Waterproof Coats and Capes, Sewer Boots, and Theatrical Air-Proof Dresses.

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*Best Materials and Workmanship Guaranteed.*

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## CONTRACTORS FOR
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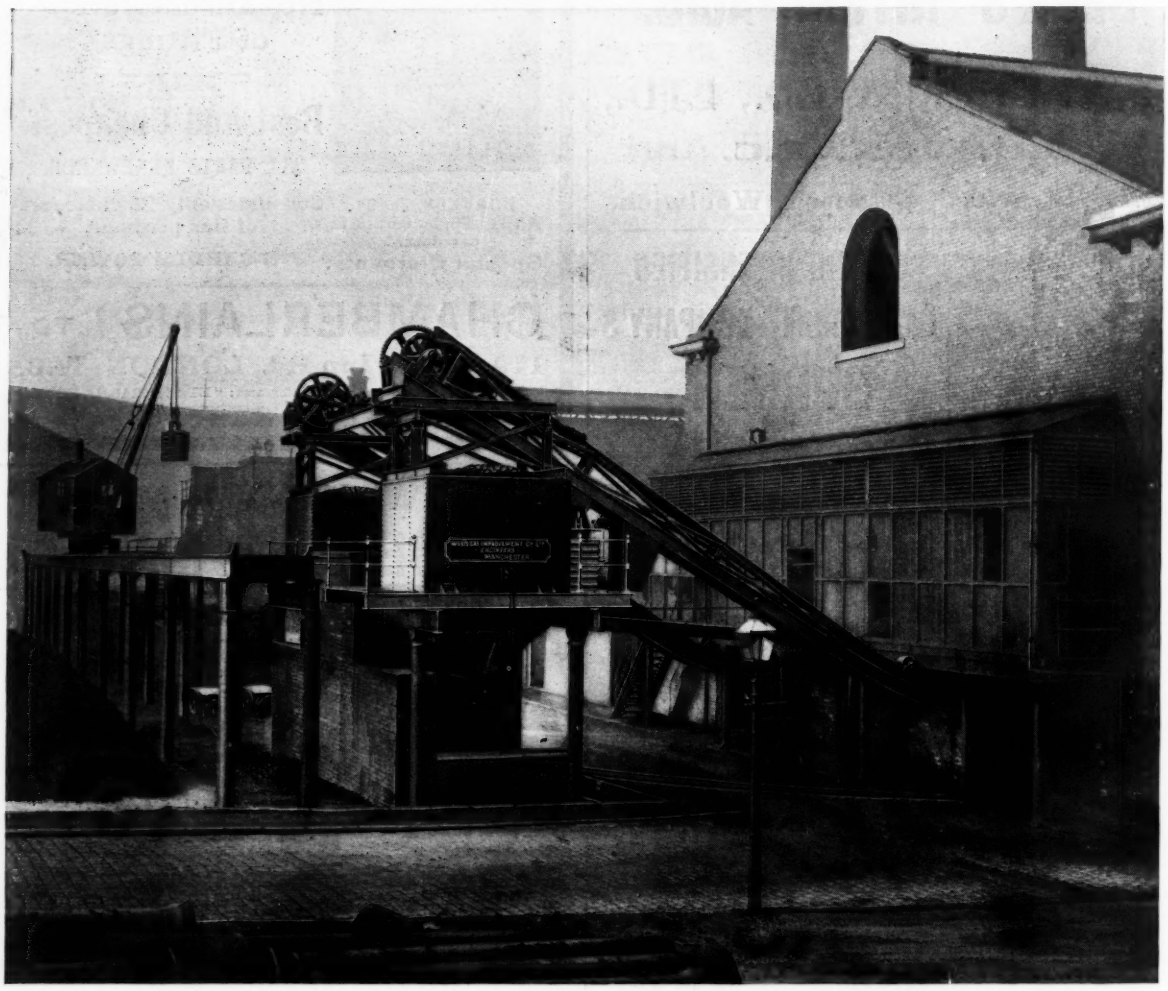
**THE HORIZONTAL OR INCLINED SYSTEMS.**



Photograph showing West's Coke-Conveyor dealing with the Coke from Nineteen Through Beds of Retorts.

## WEST'S IMPROVED PATENT HOT-COKE CONVEYOR,

With Special Chain constructed with a minimum number of parts, and having Large Joint Pins with ample Bearing Surfaces.

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**BELTON'S PATENT AUTOMATIC RELIEF APPARATUS FOR HYDRAULIC MAINS.**

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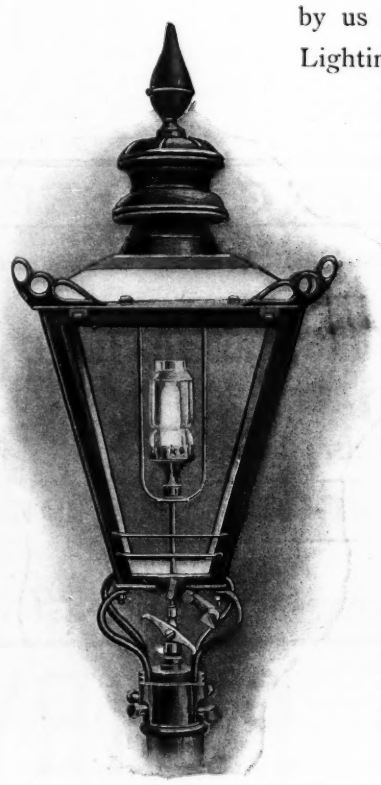
# "BAGBY" LANTERNS
## FOR
# INCANDESCENT STREET LIGHTING.

**Made throughout of COPPER (Tinned).**

FITTED WITH

**Enamel Earthenware Reflectors, and "Bray" C Burners, complete with Anti-Vibrating Frames.**

These Lanterns are being supplied by us in large numbers to Public Lighting Authorities throughout the Kingdom.



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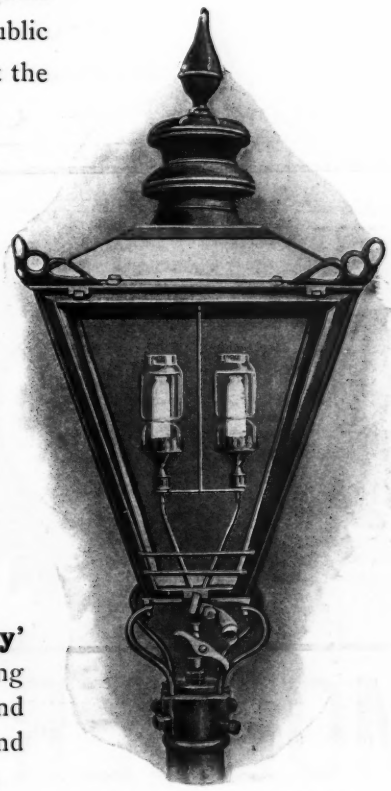
In addition to the **'Bagby' Lanterns,** we are making several other Styles and Patterns for Street and other Public Lighting.



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## GAS LIGHTING ENGINEERS,
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**G.I.C.**
**Novelties.**
**The "Simplon"**
**INVERTED BURNER**
**is simplicity itself.**

Price complete with Mantle and Globe, **30s.** per doz.

**ORDER NOW FOR DELIVERY IN ROTATION DURING NOVEMBER.**

Double Woven Ramie Mantles for all Inverted Burners, finest and strongest made, Price **45s.** per gross.

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IMPROVED
RAMIE MANTLES
**for every known size of Burner.**

We are supplying these well-known Maintenance Mantles for "C" and Nos. 2 and 3 Kern Burners, from **26s.** per gross, with reductions for quantities.

**WRITE US FOR LATEST PRICES, THEY WILL ASTONISH YOU.**

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New Polished Brass Outside Air Cone for use with above improves the appearance of Burner and increases the light by 25%. Easily fixed to existing Burners without injury to Mantles, **4/6** per gross. **G.I.C.** Heavy "C" Burner with real steatite ring, **59**/- per gross.

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Self-Intensive

# GAS LAMPS

*ARE NOW SOLD*

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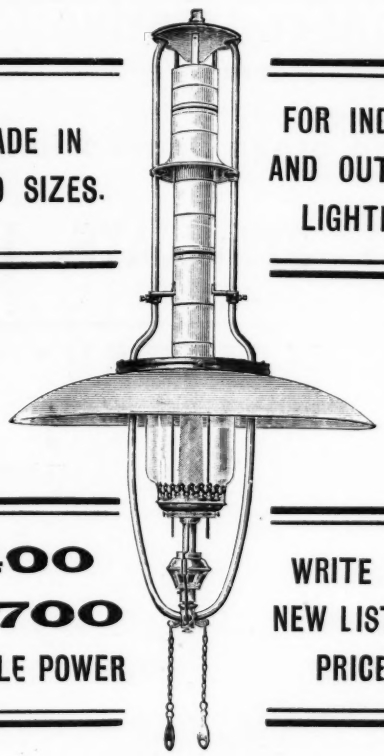
**Thus avoiding all Risk of Litigation.**



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400 AND 700 CANDLE POWER

WRITE FOR NEW LIST AND PRICES.

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Retort Fittings Complete

PURIFIERS

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PATENT 5977—1903.

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Gas Consumption, 2½ cubic feet per hour.

Supersedes Electric Light at 1-10th the Cost.

No Lighting Back.

Self-Intensifying; the Air being Superheated, giving the Maximum of Light at a Minimum of Cost.

Easily Fixed to existing Fittings.

**BURNER and MANTLE 4s. 6d., subject.**

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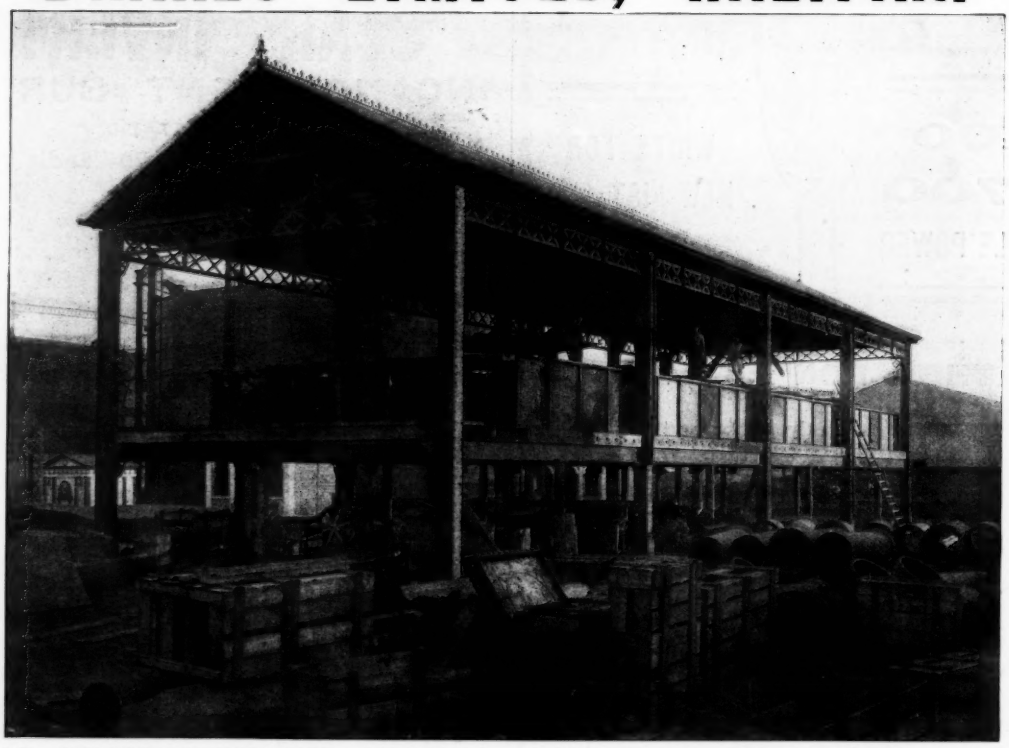

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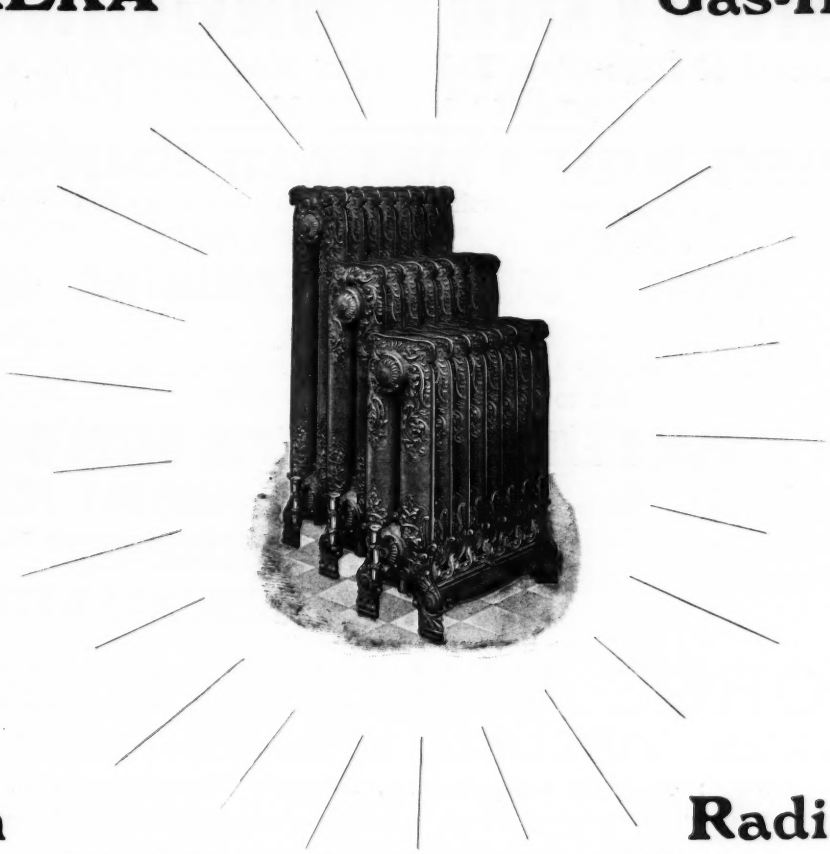

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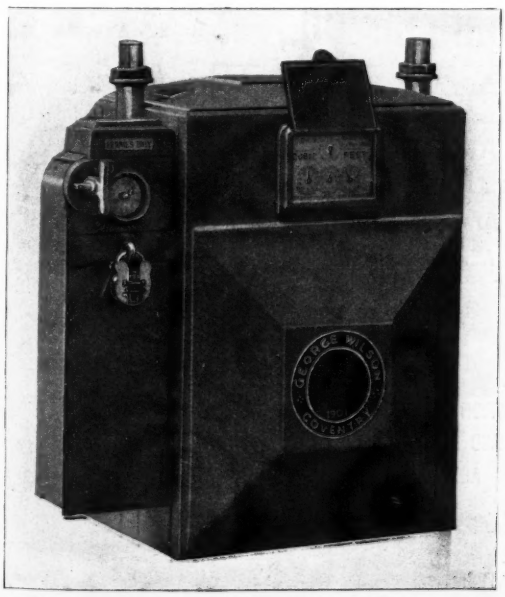


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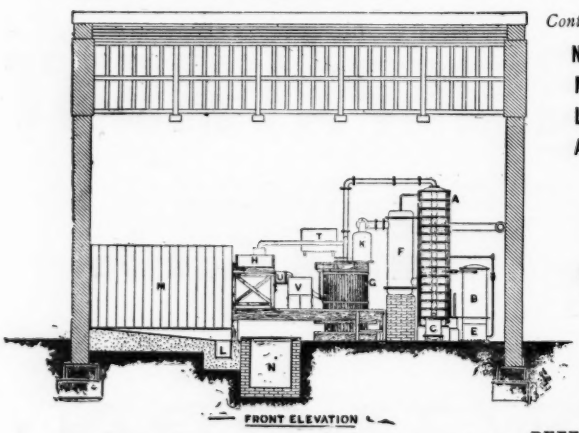

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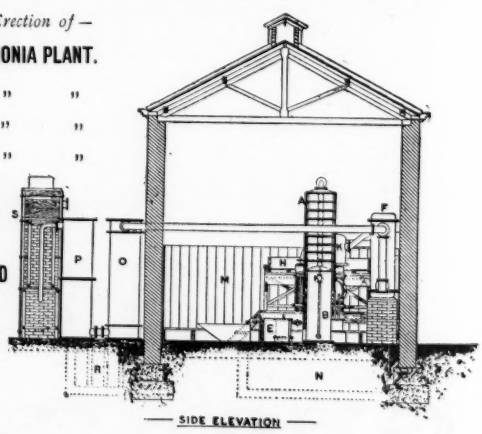

SIDE ELEVATION

REFERENCES.

*A.* Large Still (Ammonia).
*B.* Small Still (Lime).
*C.* Spent Liquor Valve.
*E.* Limeing Arrangement.
*F.* Heater.
*G.* Saturator.
*H.* Draining Table.
*K.* Lead Catch Box.
*L.* Mother Liquor Well.
*M.* Sulphate Store.
*N.* Acid Store Tank.
*O.* Condenser.
*P.* Scrubber.
*R.* Settling Tank.
*S.* Neutralization Plant.
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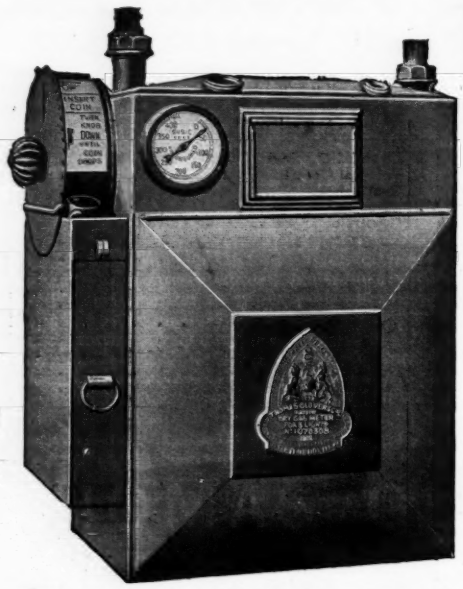

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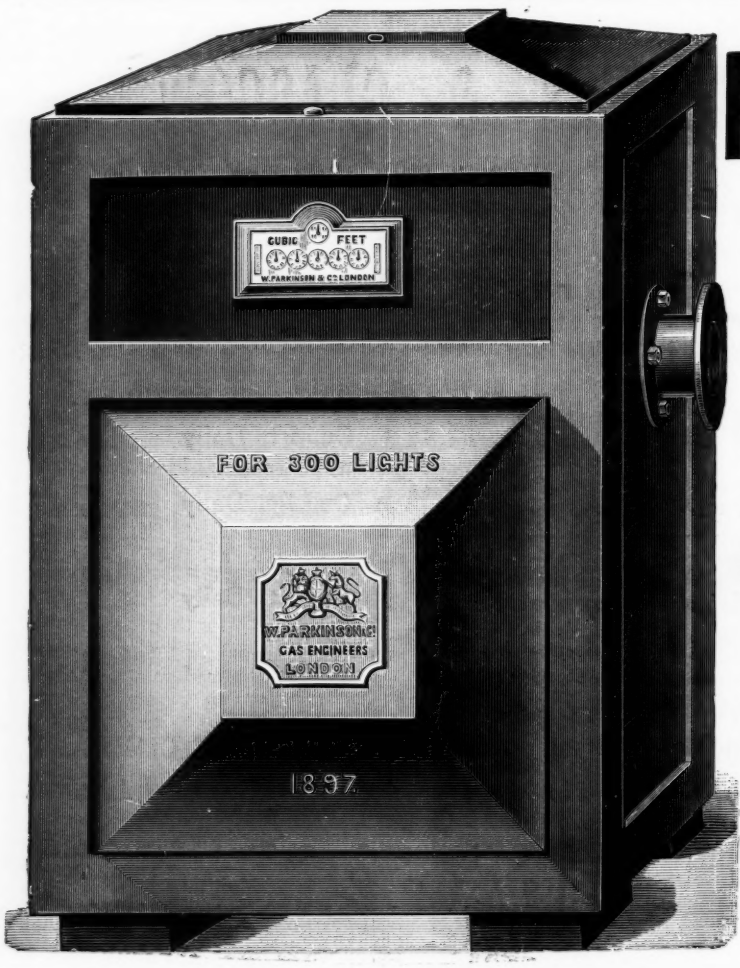


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# JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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VOL. LXXXVIII., No. 2165.—TUESDAY, NOVEMBER 8, 1904.


## EDITORIAL NOTES—GAS, &c.

### United Management of Gas Undertakings.

THE thoughtful Presidential Address of Mr. Rollin Norris to the American Gaslight Association, which we publish elsewhere, deals exclusively with the above subject, and will be read with much interest, though there may not be general agreement with his conclusions; nor, assuming them to be correct, is there any possibility of the general adoption of the system of management which he advocates. Mr. Norris claims for united management of gas undertakings—in other words, the formation of "parent" companies, controlling from a central office a number of gas companies—advantages over what may be termed "individual control," outweighing, in his opinion, any disadvantages, or, as he terms some of them, "difficulties," that may be inherent to such a system. It is obviously impossible to establish this position by reference to actual practice; and, therefore, it was only to be expected that Mr. Norris should argue the question on almost purely theoretical grounds. His opening statement is one with which all must concur—namely, that "the marked "tendency of recent developments in all lines of technical 'and commercial activity" is at present in the direction of specialization and associated effort, the result of which has been the organization of "vast corporations to direct and "control the various branches of manufacture, transporta- "tion, and distribution." He infers from this that similar organization in connection with gas supply should secure corresponding advantages.

The analogy, however, existing between gas undertakings and other industrial enterprises is not complete. Leaving out of consideration the organizations which are commonly known as "trusts," the main purpose of which seems to be to secure practical monopolies of some kind or other, and which are therefore hurtful to the community, there are many legitimate combinations of industries, the laudable object of which is to secure unity and economy of management and reduction of working expenses, either by concentration or the fusion of separate and individual interests. A case in point is that of Guest, Keen, and Nettlefolds, which is an amalgamation representing at least three interdependent industries—those of coal, steel, and finished manufactures. There is, however, no such interdependence among gas undertakings, no separate interests or manufacturing facilities that can be shared in by all members of a group; nor, except rarely, is concentration of manufacturing operations a possibility. For any advantage to accrue from amalgamation, one has therefore to look in other directions. It is true that, in the purchase of materials, something may be saved; for a combination of companies should be in a position to purchase rather more cheaply than any individual company. In the disposal of residuals, also, a combination may possess some advantage, although this is not referred to by Mr. Norris, who lays stress upon what he terms the "availability of consulting specialists."

"A single company," he says, "unless it be a large one, "cannot afford to have on its pay-roll a lot of high-class "men, each of whom is experienced and specialized in his "own line of work;" whereas "a large number of associ- "ated companies can afford to maintain a central office "equipped with a corps of trained experts, who will be avail- "able for consultation with the local management when "needed." What, precisely, Mr. Norris may have had in his mind when speaking of a "corps of trained experts"—whether this is in accordance with American practice, or is to be regarded as a mere figure of speech—cannot be determined. In this country, at any rate, it is often expected of the engineer that he should be a "corps of trained experts" rolled into one. Apart from this, however, management at a distance, even with the extensive limitations proposed by Mr. Norris, does not appear to be the most satisfactory way of carrying on the business of a gas undertaking. Combinations are sometimes unavoidable, and have, under certain circumstances, proved to be of some advantage; but, as a general rule, local management, with all its imperfections, is to be preferred. It is, after all, the man on the spot who makes or mars the undertaking; and nothing ought to be done to weaken his position or lessen his control. Divided responsibility, whatever shape it may assume, does not make for success, and but too often leads to failure. Mr. Norris very rightly attaches importance to the cultivation of a spirit of enthusiastic interest in managerial work, but is content with what he terms "the association of a number "of men working side by side for some common end," with, it may be added, the "corps of trained experts" to arouse the spirit of enthusiasm and keep it up to concert pitch. But better than this is surely the enthusiasm of the man who feels that he is working for himself, and has direct access to his employers without any go-between in the shape of a "corps of trained experts." What if he does indulge in just a little of what Mr. Norris calls "rainbow chasing." Even experts are liable to mistakes; and this may prove at the worst to be but healthful mental exercise. Anything that tends to stifle individuality is to be deprecated; and are there not always plenty of experts ready and willing to be consulted on any special point as the need arises, without the necessity of having a corps of them permanently on the back of the manager, like the Old Man of the Sea on that of Sinbad the Sailor?

### The Imperial Continental Gas Association—The Vertical Retort Trial at Mariendorf.

THE Chairman of the Imperial Continental Gas Association (Mr. J. Horsley Palmer) was not by any means short of subject-matter for his address to the proprietors last Tuesday. Commercially, the past half year has been a brilliant success for the undertaking; and there is only one dark spot in the domestic happiness—this being the recent loss of the Association's Senior Engineer at Berlin (Mr. Edward Drory). As the Chairman passed from the cheerful tidings of prosperity to this single piece of mournful news, his gratified mood changed to one of sorrow. Very feelingly he mentioned the Association's deprivation of a devoted servant, and of a clever Engineer who exercised his eminent gifts for the greater part of his life in furthering the trust—made increasingly responsible step by step in his career—with which he was charged by the Board. The life and the work are closed; and the Chairman has put it on record that the Board have lost "a great personal friend." Those words, uttered in all sincerity, concentrate much. They are the crowning effect of Mr. Drory's devotion and service, and charming and influential personality. Though the general body of proprietors could not possibly appreciate all that those did who had worked with Mr. Drory in and on behalf of the Association, there was the feeling of common sympathy among them as the Chairman paid, in the name of the Board, their tribute to their late honoured servant, and not only servant but colleague.

To return to the trading results of the half year. Those who have studied the past and present position of this great undertaking must be prepared to admit that never in its history has it been in sounder state than at the present time, not even when Amsterdam, Vienna, and Haarlem were valuable properties in the constitution. Before those concessions were ended, there was a looming uncertainty; and the stations which are now of the strongholds of the Association had not then developed to the high pitch of vitality of present times, with still good fields before them. To-day there is no uncertainty on the horizon. Prosperity holds sway, and that prosperity is the base of confident hopes for the future. Never in the last decennial period have the Association exhibited such an increase in gas business as in the past half year—the addition being but a few points short of 8 per cent.; while the number of consumers were added to at the rate of 11·28 per cent. This is an excellent record; but it is somewhat more amazing to find that the aggregate distribution plant of the Association now extends to 2001 miles, which is in excess of the mileage that stood to their credit when supplying

the three cities already named. If asked to illustrate the meaning of recuperation, assuredly nothing better could be presented than the past few years' history of the Imperial Continental Gas Association. It is hardly to be wondered at that the Stock Exchange have lately been interesting themselves in putting up, by several points, the value of the Association's stock. In addition to these extensions in the gas business, the Board have been particularly successful in other branches of their trading—that is to say, in their purchases of coal and in the sale of their residuals; so much so that while the gross cost of coal showed a further decrease of 6·93d. per ton compared with the corresponding half of 1903, with the increased values of the residuals the net cost of the coal was less by 10·2d. per ton. Beyond these and similar pleasant experiences, the Chairman praised the dual meter system as a consumption-promoting means, and recommended it to the attention of gas administrators on this side. This is a question that years ago was frequently considered; but we are afraid it is too late now to think of applying such a system to domestic consumption here. The greater the trend towards lower-priced gas, the less likely—remote as the likelihood has always been—is such a system to obtain a hold, excepting, of course, for large power consumption. Generally speaking, the progress of gas affairs on the Continent is along the now well-beaten paths which are being trodden in this country—the prepayment consumer and the incandescent burner having fortified gas and also strengthened its prospects there as here.

In connection with this progress as illustrated by the Association, the Chairman made comparison of recent years' accessions to the number of consumers with those of the Gaslight and Coke and the South Metropolitan Companies; but he obviously only did this to accentuate the animation which exists in the Association's business on the Continent. There can, of course, be no real comparison of their business on any standard lines with that of the great London Gas Companies. Everything—as everyone knows who has acquaintance with the Continental cities and towns supplied—is different. The business of the Association has no less than thirty centres, varying greatly in their characteristics; whereas the South Metropolitan Company and the Gaslight and Coke Company have each only one. The populations in the districts of the latter, too, are concentrated; but in the greater number of the towns supplied by the Association, excepting in the main streets, there is nothing like the same density of property. And, furthermore, the habits of the people are not of that home-abiding order which conduces to large average gas consumptions. Notwithstanding all these comparative disadvantages, however, the Association are showing an average annual make of gas per consumer of 32,000 cubic feet, and per mile of main of 4,520,000 cubic feet. But it would be impossible unless some higher power than themselves gave to their cities and towns the same form and same character of population as we possess in London for them to show such large figures in these respects as are enjoyed by the London Gas Companies.

Next to the matters already touched upon, interest will be taken in the remarks of Mr. Horsley Palmer on the subject of the vertical retort trial at Mariendorf. It was hoped that by this meeting the Chairman would have been able to announce the verdict of the engineers who have been vigorously working at it. Reading between the lines of the statement on the subject, there has been disappointment with the results obtained from the twelve trial retorts which, "though they were working well during the year, were not "yet what the engineers considered perfect." At the same time, these gentlemen must have received a certain amount of encouragement, in view of the facts that they still believe there is a great future for this system of carbonizing, and that they have asked for, and secured, permission to make further experiments "in the hope that the system might be "perfected." The erection of a further retort-house at Mariendorf is awaiting the results of these experiments. Will that house be equipped on the vertical system? The answer is more uncertain to-day than a few months since rumour inclined us to think. It must be remembered that the vertical retorts at Mariendorf have an installation of inclines to compete with in the matter of working results, into which installation Mr. Drory put the fruits of long and comprehensive study. Before the trial vertical retorts can be called successful, they must for Mariendorf beat the inclined system, either in working costs or producing results, and must at least show equality, if they cannot attain superiority.

## Incandescent Gas Appliances.

It is only natural that the great success of incandescent gas lighting, alike for public and for domestic use, should have stimulated invention in the direction of new or improved applications; nor is it any disparagement of what has already been achieved to say that there is plenty of room for further improvement, though recent proceedings may indicate that the ground is already fairly covered. In our last issue there appeared a report of legal proceedings for infringement of patent instituted by Moffats Limited, as owners of the well-known Lucas lamp. It is satisfactory—in a limited sense, at all events—to be able to record the termination of these proceedings by the parties coming to an agreement which is practically an admission on the part of the defendants of the validity of the patent. We say "satisfactory," because in the abstract, however it may be departed from in the concrete, there is a general disposition to give honour where honour is due, whatever may be the degree of merit involved; while the satisfaction is limited, inasmuch as the agreement may mean but little more than that both parties were well advised, each in their own interest, to come to terms. It is, at all events, clear that such an agreement does not establish the validity of a patent, though it may go a very long way towards it. In this case, one of the chief features of the invention is a chimney of unusual length, by which the draught is intensified and the air supply to the burner brought up to the full requirements of economical combustion without the necessity of recourse to compression or other adventitious aids. The simplicity of the invention by no means detracts from its merit. But the question which was pertinently asked by the learned Judge who presided at the trial—namely, what is a long and what a short chimney?—seems a crucial one, and this, by the termination of the proceedings, remains (in a judicial sense) unanswered.

This calls to mind another recent settlement of an action for infringement of patent, to which these observations also, to a certain extent, apply. We refer to the one brought by the New Inverted Incandescent Gas-Lamp Company, the terms of settlement of which were reported in our issue for the 23rd of August. It seems to be the fate of almost every originator of a new idea to have to run the gauntlet of imitation; but those who are disposed to throw down the gage of defiance would do well to remember that he is entitled to be regarded as an inventor who first achieves a technical success, however near to the goal others may have been. This much may be said, though it is no part of our function to discuss the claims to novelty of any particular invention. But in the history of incandescent lighting, whenever it comes to be written, the inverted burner seems to be destined for a notable place; and those who were first in this new field, whoever they may be, are certainly entitled to honourable mention. It may be that a thoroughly satisfactory inverted burner has yet to be invented. But the great progress already made encourages the belief that ultimate complete success is only a matter of time and further effort. If we might venture to throw out a suggestion, it is that more attention should be paid to the production of small burners consuming 1 or 2, or perhaps 2½, cubic feet per hour. With burners of this small size, whether used singly or in groups, the tendency to form a strong upward current of hot air impinging on the ceiling would be less than with burners of the ordinary size; and the objection commonly urged to the use of gas in dwelling-houses, that it discolours ceilings, should be to a very great extent overcome.

## Trade Unions and the Premium Bonus System.

Since the publication of the article on the above which appeared in these columns on the 4th ult., the matter has proceeded a step farther by the adoption and issue, as the manifesto of the Executive Council of the Federation of Engineering and Shipbuilding Trade Unions, of the adverse report on the system made by the Sub-Committee appointed to consider it. Thus the New Trade Unionism has finally and definitely committed itself to antagonism to a system the economic feature of which has been described as "the "highest possible production at high wages, but at the "lowest possible cost."

The time selected for this indirect challenge to industrial warfare cannot be regarded as opportune, inasmuch as the

keenness of competition for orders, not only in the shipbuilding, but in all other trades, is greater at the present time than it has been for some years. Economy of production is therefore being aimed at on all sides; and if this can be secured with actual advantage to the workmen employed, a heavy responsibility would seem to rest upon those who incite to its rejection. It is but fair, however, to consider the grounds on which this opposition is based, as these become more and more apparent. That the defects in the system are hugely exaggerated is evident from the satisfaction it gives to the Amalgamated Society of Engineers, which, as stated in our previous article, numbers an effective membership of 83,897, and includes practically the whole of the fitters and turners in the country. But objection is made to "any system of payment of wages except by "the hour, or in cases where piece-work is recognized by "mutual arrangement between the workmen or their repre-"sentatives and the employer." Objection is also taken to the employer having any share in the value of the saved labour, whether or not the saving can only be effected by the aid of the machinery or other appliances furnished by him, and to the time allowance being fixed in the first instance by the employer.

According, therefore, to this latest indication of the views of the Federation, the *crux* of the situation appears to be that in their opinion the workman is entitled to the whole of the value of the time saved, and to have an equal voice with the employer in fixing the time-limit. This sounds uncompromising, it is true; but is there no way out of the difficulty? Why, as suggested in our previous article on the subject, cannot reasonable men on both sides meet and discuss the matter? To reconcile the respective claims of capital and labour cannot and ought not to be an insoluble problem. In our own industry, as all are aware, it has been satisfactorily solved by the co-partnership system inaugurated by Sir George Livesey, though unfortunately few there be who follow it. The premium bonus system aims at establishing identity of interests between employers and employed; and it has already been attended with a large measure of success. In human institutions, however, there is nothing perfect; and that this particular institution is susceptible of improvement may be regarded as a matter of course. But if opposition on the part of the Federation is to be interpreted simply and solely as a Trade Union declaration against differentiating the rewards of labour, it is much to be feared that it may prove to be but the prelude to a struggle on the whole wages question.

The New Trade Unionism has identified itself so much with the idea of equal time wages to all workmen alike, that it rests under suspicion in regard to its attitude on the question under consideration. If its real aim be to keep down all workmen to the level of the weakest member, no sympathy will be felt for it in the coming conflict, if conflict there is to be. On the other hand, if the opposition is not directed to the differentiation of labour, but simply aims at securing for all capacities what appear to the Federation to be fairer conditions of labour, it will be a thousand pities if the matter cannot be thoroughly threshed out in argument. In any case, the present condition of trade imposes a limit on what it may be practicable to concede or demand, which neither side can afford to disregard.

## Incandescent Burner and Mantle Testing.

THE discussion which has been raised by correspondents—particularly by Mr. Rettich in last week's issue—on the subject of the testing of incandescent burners and mantles has brought from Mr. Jacques Abady an article which deals with the matter in an eminently clear and practical manner. He methodically lays down his points, discusses them, and carries them, we think incontrovertibly, to the conclusion that it would be futile to establish a standard burner and mantle for incandescent testing, and that a standard set of conditions in connection with such testing is not desirable and not possible. This conclusion coincides with the conviction shadowed in the editorial notes on the matter last week. There can be no assurance that any burner or mantle will give its user of its best in the varied and changing circumstances of the gas supply in different districts, or any single district, in obedience to any hard-and-fast prescription for its use; and this is effectively shown in the article that is published elsewhere. It is not intended, however, to further discuss the matter this week; the present reference having a special purpose. It is this: While conditions cannot be codified that would be applicable to all gas burners, mantles, and qualities and pressures of gas used in them, it should not be impossible to define the rules that should be observed in photometrically ascertaining the value of the maximum light that can be obtained from any burner and mantle used in any way so as to secure the maximum; and it is possible that something may be quickly presented, if readers are sufficiently interested. The remark will not be any news to readers of the "JOURNAL" that Mr. Abady is a specialist in photometry of several years' standing; but they may be reminded that, during the past few years, he has been working closely at the question of testing incandescent mantles and lights of various colours in conjunction with Mr. Simmance. What, in view of this, may be proposed is that readers should communicate to the "JOURNAL" notes on any difficulties that they may have encountered in incandescent burner and mantle testing, or suggestions that they may have to offer. After digesting these, Mr. Abady will be quite prepared to draw up a set of photometric rules for consideration. We hope our readers will readily fall in with the idea.

### An Effect of Co-Partnership.

The Editor of the "South Metropolitan Gas Company's Co-Partnership Journal" lays all and sundry connected with the undertaking under tribute in the matter of supplying material for his pages. He is an inexorable person; and all, from Sir George Livesey downwards, have to yield to him. In the October number, Mr. Frank Bush appeared as the author of the opening article; and Mr. Charles Carpenter has had to succumb to the Editor's entreaties this month. From what he has written (addressed though the words were to South Metropolitan men only), we lift bodily, in order to give them a wider circulation, the following passages, illustrating, as they do, "an effect of co-partnership": "In trying to think of an expression which should describe the greatly changed state of the relationship between the officers and workmen which co-partnership has brought about, the French word *camaraderie* occurs to me as the most suitable. Its literal meaning may, I think, be taken to be the living or working together in comradeship. . . . Under the genial sun of co-partnership, the hard-and-fast line of demarcation which previously existed between staff and workmen has disappeared. The stoker and the engineer have both become partners in the business in which they are employed; and their interests are both bound up in its prosperity. The result has been the creation of an entirely new feeling between all grades of employees; and I feel no better word can express this now existing condition than *camaraderie*. Our undertaking has grown enormously since I first became connected with it. It now gives employment to between 5000 and 6000 men; yet I speak from experience when I say that, from the labour point of view, it is now much more easily managed than were the smallest works under the old system. Just consider for a moment the altered effect there must be upon the welfare of the Company between 5000 men working indifferently on the one hand, or honestly doing their best on the other! Yet the latter is all that is required of them under the co-partnership scheme which has been the crowning labour of our Chairman's busy life. What an enormous vital force for good must be 5000 brains and bodies working with a common aim and object!"

### The Power of Trade Unions.

The columns of "The Times" have during the last few days contained further evidence of the good that is being done by the National Free Labour Association in defending working men from the high-handed methods of the Trade Unions. More will probably be heard of the particular incident referred to in this correspondence, inasmuch as the Association are taking Counsel's opinion on behalf of the men concerned, and the Secretary (Mr. W. Collison) states that there is every hope of making the Shipwrights' Provident Union of the Port of London justify their action in a Court of Law or compensate certain former members of the Society who have been expelled. It would not therefore be necessary to refer at all to the matter at the present stage, were it not for the fact that such great prominence has been

given to it by the long letters appearing in our contemporary under the heading of "Trade Union Tyranny." It is, of course, quite true that one story is good until another is told; and it is only fair to say that the accuracy of some of Mr. Collison's statements have been challenged by the Secretary of the Shipwrights' Union. Mr. Collison has, however, presented a very definite case; and if (as is to be presumed) he has made certain of his facts, it presents serious food for reflection on the part of Trade Unionists generally. Briefly, it is stated that 28 members of the Shipwrights' Union accepted an engagement at Newport (Mon.); and that, though no official objection was made to their going there, the men (some had paid into the Union for over forty years) were subsequently expelled from their Society. On their return to London, the Caulkers' Society passed a resolution that they would not work where these men were employed; and consequently they are said to be reduced to a state of destitution. The Secretary of the Shipwrights' Union denies influencing the Caulkers' Society to pass their resolution, and naturally seeks to justify the action of his Executive in expelling the members. But whichever version of the story be correct, the possession by Trade Unions of so much power to influence the welfare of working men interferes far too much with the liberty of the subject to be viewed without grave misgiving. And it would be a great deal more serious still in the event of the Unions being freed by Parliament from all legal responsibility for their actions.

### Interesting Figures at Southampton.

Last week's half-yearly meeting of the Southampton Gas Company was the fortieth similar gathering which the Chairman (Captain A. Corse-Scott) had attended in the capacity of a Director; and a suitable opening therefore presented itself for the production of some comparative figures. The progress of the undertaking during the twenty years referred to has been such that the opportunity thus afforded of demonstrating it to the shareholders was very naturally taken advantage of. The year 1884 is not a very great way back; and yet in the interval that has elapsed between then and now the gas consumption has increased from 224 to 614 million cubic feet. Roughly speaking, therefore, the sales of gas are three times as large now as they were twenty years ago; while there are nearly four times as many consumers. That even these figures (excellent as they are) will very soon be surpassed, cannot for an instant be doubted, in view of the announcement made of the intention to reduce the price of gas in the added areas, so as to make one uniform charge over the whole of the extended borough. This step the Company were bound to take within ten years from 1898; but seeing their way clear, they have wisely decided not to wait until the expiration of the stipulated period before lowering the charge. Another decision come to by the Board is to let approved patterns of gas-fires on hire at the moderate rental of 1s. a quarter; and they have also, at the request of the Corporation, converted the whole of the street lighting from the flat-flame to the incandescent system. The Chairman indulged in a mild grumble at the 2d. per 1000 cubic feet of gas sold which has to be paid away by the Company in rates and taxes—though he did so not, of course, with any hope of changing this condition of affairs, but so that the consumers might understand how much they are thus indirectly contributing to local and Government expenditure through the price paid for their gas. In spite of this heavy item, the Guardians, it seems, are anxious to still further increase the assessment of the Company's property. It is to be hoped, however, that they will prove amenable to reason, and not involve the citizens as ratepayers in a fight with the citizens as gas consumers—which would be literally a "one-sided" affair, for the inhabitant of Southampton who was both a ratepayer and a gas consumer would have the pleasure of contributing to the costs whichever way the result went.

### The Protection of Gas-Mains.

It will be seen from our "Legal Intelligence" to-day that the dispute between the Chepstow Gas and Electricity Companies, which was the subject of adjudication by the local Magistrates last June, has now reached the High Court in the shape of a special case. The proceedings commenced in February with an arbitration held by Major Cardew, as the result of an application to the Board of Trade by the Gas Company, who said that the Electric Light Company had failed to comply with their request, when the cables were being laid, for the protection of the gas mains and pipes and the securing of access thereto. Major Cardew found that the Electric Light Company had failed to give the Gas Company the requisite three days' notice before commencing to dig trenches, and that certain of the cables were laid in such a way as not to afford protection and access to the gas-mains. He therefore ordered the Electric Light Company to pay compensation for loss and damage, as well as the costs of the arbitration and award. As the result of this finding, the Gas Company took out two summonses. The first had reference to the failure of the Electric Light Company to give the necessary three days' notice of their intention to open up trenches, and the second to the fact that the cables were laid in such close proximity to the gas-mains as to render them difficult of access. The summons relating to the three days' notice was dismissed as being out of time; but the Magistrates held that the matter dealt with in the other one was a continuous offence, and imposed a fine of £1 and a daily penalty of £1 during default. The decision of the High Court was thereupon asked upon the question of whether this decision was right in point of law; the contention of the Electric Light Company being (among other things) that the offence was not a continuing one, but was wiped out by the payment of the amount of the loss and the damages as assessed by Major Cardew. Mr. Shiress Will, on their behalf, also submitted that the Magistrates ought not to convict for daily penalties until after there had been a conviction; and that there could not be a conviction for offences in the future. The Gas Company, on the other hand, argued that, in spite of the amount awarded them under the arbitration, they still had the right to have the wires removed—the damages being only assessed up to the date of the award, and not on the theory that the pipes were to remain where they were. Mr. Macmorran, K.C., who appeared for them, admitted, however, that it was a conviction for an offence, and that he could not add penalties for future offences. The Court held that the question of penalty and of compensation had no relation to each other; and that there was nothing to show that the offence was complete more than six months before the summons was taken out. The appeal was therefore dismissed; and the Gas Company may be congratulated upon their third victory in connection with this long drawn-out dispute.

## WATER AFFAIRS.

### The Rivington Watershed Arbitration.

By the publication last Friday of the award of Mr. R. E. Middleton, the Arbitrator chosen to determine the amount to be paid by the Corporation of Liverpool to Mr. W. H. Lever, of Port Sunlight, for his estate on their watershed at Rivington—which they sought to acquire, under powers conferred upon him by their Act of 1902, in order to preserve the purity of the water passing into their reservoirs—a dispute which has given rise to much acrimony has now been settled. The origin of the trouble is rather interesting. Three years ago the City Council took the initial steps to acquire 2100 acres of land, forming part of the Rivington watershed, which the owner desired to sell. The amount they offered was not, however, deemed sufficient by him; and consequently negotiations were broken off. Thereupon Mr. Lever re-opened them on his own account, and eventually became the possessor of the property for £60,000. Part of it, comprising 365 acres, he presented to his native town of Bolton for the purpose of making a public park, thereby obtaining for himself the freedom of the borough; while another portion, amounting to 48 acres, was reserved for his private estate, and a bungalow erected on it. The gratification of the Bolton burgesses at possessing a park through the munificence of one of their fellow-townsmen was not shared by the Water Committee of the Liverpool Corporation, who feared that the congregation of people upon a spot bordering their Rivington lake might lead to the contamination of the water therein. The fear was a very natural one; and that it was not altogether groundless was proved by the Corporation being granted by Parliament practical control of the park—at the expense

of the city. There still remained 1687 acres of the estate; and, in view of the fact that only £60,000 had been given for the entire property, the Committee offered Mr. Lever £40,000 for it. If he had accepted this sum, he would have obtained his estate and all the *kudos* attached to the gift of the park for a modest £20,000—a mere trifle, surely, to the owner of Port Sunlight. The offer of the Committee did not by a long way come up to his requirements, as they found when, to their amazement, no less a sum than £457,000 was named as the price Mr. Lever asked for the coveted property, which had not undergone any change since it had been in his possession. Such a demand was preposterous; and the matter went to arbitration. It was shown at the arbitration that the value put on his property by Mr. Lever could not be justified even by his own witnesses; nor, in the opinion of the Arbitrator, could the sum offered by the Committee. In the result, he has awarded Mr. Lever £138,449, which is £318,551 less than he wanted, and £98,449 more than the Committee were willing to pay.

The principal sufferers by the transaction referred to will be the citizens of Liverpool, who will have to bear expenses which might have been lightened by the adoption of a different course in the early stages of the negotiations. However, it is always easy to be wise after the event; and though the Committee must be credited with having acted in what they considered to be the best interests of the ratepayers at large, they will probably have many times regretted they did not increase their offer, and secure the whole estate when they first treated for it.

## A Dry Year and its Effects.

THE interesting letter recently addressed by Dr. Hugh R. Mill to "The Times," and quoted in the "JOURNAL" last week, calling attention to the falling off in the rainfall in London this year as compared with last, shows that we have been passing through a critical time, although, fortunately, the Metropolis has not been made conscious of it. In the present year, the rainfall in London has been only 17·09 inches, compared with 34·61 inches in the first ten months of 1903; but the effect has not been the slightest curtailment of the supply. Thanks to the ample storage provided by the late Water Companies, there were in reserve at the close of September no less than 3188 million gallons of water; while the large reservoirs at Staines contained rather more than this quantity. During the months of June, July, and August, the supply was at the rate of 34, 37, and 34·3 gallons per head respectively. But a very different state of things prevails in many towns in the Provinces. Manchester has been in sore straits for many weeks, the supply at night having to be withheld; and the quantity of water at command from the old works at Thirlmere, Longdendale, and sources nearer the city, had diminished last week to the calculated needs of only about 17 days ahead. Fortunately, the second pipe-line has just been brought into use; and it will furnish an additional 10 to 12 million gallons of water daily. This will have the effect of relieving anxiety. Farther north, the Weardale and Consett Water Company have had, as from last Saturday, to curtail by one-fourth the supply of water for manufacturing purposes. The drought in south-west Durham has had no parallel in local annals; the springs being lower, and the rivers and their tributaries shallower, than they have ever been in November, so far as can be remembered. At Northallerton the water supply has been stopped from 8 p.m to 8 a.m. The Newcastle and Gateshead Water Company have been compelled to cut off the supply from a portion of their out-district, in order to safeguard the city. At Skipton the town's water is now shut off from 7 p.m. to 7 a.m.; while at Middlewich, where the supply has for many months been limited to three hours a day, a further curtailment to two hours has had to be enforced. One can scarcely suppose that the drought will continue much longer—indeed, there are already signs of its conclusion; and certainly in the places named, and many others, some good heavy rains would be very welcome. But Dr. Mill says that unless the current and next month should prove "quite exceptionally" wet, the present year will once more confirm the apparently meaningless rule that all years ending with a four are dry. The "meaningless" rule has, however, held good for nearly a century, inasmuch as there has been only one exception to it—*i.e.*, the year 1894—since 1814. Under these circumstances, the next nine years may be expected to be wet ones.

## THE GAS STOCK AND SHARE MARKET.

**(For Stock and Share List, see p. 420.)**

THE Stock Exchange has had an agitated week. It opened pretty well, though dealers were shy of committing themselves in view of Tuesday being a closed day. The alarm and apprehension engendered that day depressed the re-opening on Wednesday, and prevailed more or less, with calmer intervals, until nearly the close, when things took a steadier turn. Nervousness, however, is not yet dispelled, and great caution in dealing is the rule, awaiting developments. In the Money Market, the position was a deal tighter; and a good demand promoted stiffer rates. It is not too soon to begin to forecast the prospect of an advance in the Bank rate. Business in the Gas Market was fairly active on the whole, and on one or two days it was extremely brisk. The general tendency was favourable, in spite of the depressing effect produced by the public alarm; and several stocks advanced their quotations moderately. An alteration was made last week in the official quotations on the London Stock Exchange, which we record with pleasure. For many years past, we have from time to time drawn attention to the unreasonably wide prices at which stocks were quoted in London, and have contrasted with these the practice of Provincial Exchanges, where stocks were quoted at much closer and fairer prices; and it seemed to us there was no reason why London could not do what the Provinces with their smaller volume of business could. This desirable change has been initiated; and London prices are drawn in closer. The following remarks of "The Times" are so in accord with our oft-expressed views that we reprint them: "The alteration will be welcome to brokers and their clients, since the very wide margins hitherto given in the official quotations, which are supplied by dealers, have tended to make the list an untrustworthy guide to the price at which business can be done. And it was very desirable that quotations should be brought into closer connection with the actual dealing prices." In Gaslight and Coke issues, the ordinary was very active at pretty steady figures, which ranged from 94 to 95⅜. The secured issues were quiet. The quotations of the ordinary and the preference were drawn in half a point. South Metropolitan was strong, and changed hands at the high figure of 128½. Commercials were not touched. In the Suburban and Provincial group, business was quiet, but at good prices; and Brentford, Brighton, British, and Newcastle advanced. In the Continentals, realizations of Imperial after the recent quick rise put the price down a point. Among the remoter undertakings, Oriental, San Paulo debentures, and South African advanced.

The daily movements were: On Monday, both Brightons advanced 2. On Wednesday, San Paulo debenture rose 2, and British ½. On Thursday, Brentford debenture rose 2. On Friday, Oriental improved 3; but Imperial receded 1. On Saturday, South African rose 1; but Tuscan fell ¼, and Gaslight ordinary and preference were drawn in ½ each.

## ELECTRIC LIGHTING MEMORANDA.

**A Street Lighting Report by the Electrical Engineer of Manchester—Portable Imperfection—Comparative Illuminating Powers—And Costs, at 0·95d. per Unit of Electricity!—From Lethargy to Vigilance.**

THE journalists who are engaged in commenting upon, and chronicling weekly, the affairs of the electrical industry have had little encouragement to tackle the question of the comparative costs of incandescent gas lighting and electricity in respect of their relative efficiency; but, at the end of last week, there were signs, in certain quarters, of unwonted elation. A report by Mr. S. L. Pearce, the Chief Electrical Engineer of the Manchester Corporation, was the cause. Drowning men are glad enough even to clutch at straws; and electricians who have been beaten at every turn in the matter of economical lighting are equally pleased to grasp anything, flimsy though it be, which will give them a passing feeling of triumph. They are quite welcome to Mr. Pearce's report in all its fulness, including its obvious defects. In the Gilbert arc lamp, with which he has been experimenting, he has found the acme of perfection as arc lamps go; and it is with them that he is trying his best to convert the Manchester Corporation from the "error of their ways" (as he regards them), and to capture a large proportion of the street lighting. It will be interesting to see how his figures will go down with even those whose knowledge of arithmatic is of the most elementary order. In the first place, he has carried out some street tests of the electric lamps and intensified incandescent gas-lamps with the portable photometer. This is an instrument the accuracy of which, the "Electrician" asserts, "is beyond doubt." Conjoined to this statement, is one which says the tests "are not the result of the cogitations of untrained persons who juggle with imaginary statistics, and finally evolve a comparison which is only striking by reason of its grotesqueness. Many such comparisons, have, of late, emanated from those interested in the gas industry; but they have lacked the hall mark of authenticity, and have therefore been properly ignored." Any excuse is better than none. We have our own opinions, however, as to why the comparisons

have been "ignored." But that the portable photometer is an instrument "the accuracy of which is beyond doubt" is an assertion that is "striking only by reason of its grotesqueness;" and it is one that lacks the "hall-mark of authenticity," and ought "very properly to be ignored." The writer in the "Electrician" evidently does not know the instrument; if he does, he has had no extended experience with it, or otherwise he would have learned that "accuracy" as one of its attributes has no existence. The portable photometer has not commended itself for its accuracy to some of our highest scientific authorities, nor to Parliament after a long inquiry, though it does to the writer in the "Electrician"—immediately it suits his purpose. The opinion may be ventured that, if Parliament proposed to impose penalty tests on electricity suppliers in respect of the illuminating power of their lamps, as tested by the highly "veracious" portable photometer, there would be poignant criticism in the pages of our contemporary. which would make this week's recognition of an unpossessed quality look mighty grotesque.

Turning to Mr. Pearce's report, there are set out the "maximum" candle powers observed both for the Gilbertian electric arcs and the high-power incandescent gas-lamps. They are figures obtained with a portable photometer; and gas men can afford to smile over them. We will not impugn (beyond declining to accept them as indisputable, in view of the method by which they were obtained) the lighting powers ascribed to the electric lamps; but we do say, if the intensified and other high-power incandescent gas-lamps are maintained in proper order, that the illuminating power ascribed to them is absurd and inaccurate. And if inaccurate, the values of the electric arcs are also discredited. These are the figures: Piccadilly, 9-ampere arcs, 1152-candle power; Albert Square, 6-ampere arcs, 850-candle power; Piccadilly, 6-ampere arcs, 753-candle power; Sackville Street, intensfied gas-lamps (three burners), 525-candle power; All Saints, incandescent gas-lamps, 312-candle power; Parker Street, Scott-Snell lamps (one burner), 291-candle power; and Cheetham Hill Road, incandescent gas, 147-candle power. Gas people know what can be done in intensified gas lighting; and they well know the foregoing figures as representative for intensified and other high-power gas-lamps can readily be impeached and refuted. Is it not strange that the remarkable Gilbert arc lamps have been so long in being discovered? Why the Westminster and Holborn Councils did not adopt them in Kingsway and Aldwych and the Surrey Commercial Docks Company for lighting their New Greenland Dock (see opposite page), is a riddle, to which perhaps some electrical friend will supply an answer.

At the same time, the electrical press, or rather (it is necessary to exercise care) the representative papers that we have seen, have not had much to say on these relative illuminating powers. It is on the question of comparative costs that they have shouted loudest. And what figures they are! The very base on which the electrical calculations are founded is of such weakness that the whole of the superstructure must tumble. In the case of the intensified gas lighting, the figure supplied by the Gas Department to Mr. Pearce is 1·08d. per 1000 candle-power-hours; and this includes 10 per cent. for depreciation. It may be pointed out, too, that it is calculated at a price per 1000 cubic feet of gas, which includes all charges against the gas undertaking; and that is more than Mr. Pearce's figure for electricity does. Taking 4000 hours' burning, and a degree of illumination equal to 1000 candles, the cost of the intensified gas lighting works out to: 4000 hours × 1·08d. = £18. But the Electrical Engineer of Manchester does not come out very gloriously in making his calculation for electric arc lighting, by which he shows that the cost "under the same conditions" only amounts to £12 12s. 6d. per lamp. This price is made up by taking 4000 hours × 0·7 unit per 1000-candle power = 2800 units × 0·95d. per unit = £11 18.6d. To this has to be added carbon and trimming 8s.; and 10 per cent. depreciation, £1 3s.—making the total £12 12s. 6d. Now observe the unfairness of this. The charge per unit, according to the last available returns, for public lighting in Manchester is 2d.; for private supply, 3·26d.; and for traction purposes, 1·49d.—the average for the total supply being 2·21d. The surplus profit last year, after providing for interest and sinking fund, worked out, on the number of units sold, to about 0·27d. per unit; so that electricity cannot be sold except at a loss in Manchester for less than a shade under 2d. per unit for any purpose, without throwing the burden of the loss on to the private consumers. If we take the figures from the "Electrical Times" table of costs, it is seen that, in the last financial year of the Manchester electricity undertaking, coal and other fuel cost 0·31d. per unit; oil, waste, water, and stores, 0·06d.; wages of workmen, 0·21d.; repairs and maintenance, 0·24d.—making the total of works costs 0·82d. Rents, rates, and taxes were responsible for 0·13d.; management, salaries, &c., 0·12d.—making, with the 0·82d., 1·07d. To this must be added sinking fund and interest, which represented, on the sale of last year, not far short of a further 1d.—thus making the total charges per unit sold last year, as near as possible, 2d. Now by what means can Mr. Pearce justify his calculation of 0·95d. per unit for public lighting? It is both misleading and unfair, and has been adopted for no other purpose than to show an advantage over a competitor. With any business man, the ruse must defeat its own object. It must be maintained that 2d. per unit is the figure that should be taken; and this would make the cost for electricity per lamp £23 6s. 8d. Add to this carbon and trimming 8s., and depreciation 10 per cent. £1 3s.; and we have a total (to make each lamp simply self-supporting) of £24 17s. 8d., as against £18 for the intensified gas-lamps. Has Mr. Pearce worked out the cost of intensified gas lighting on the same lines as he has adopted for the electric lamps, ignoring everything for gas excepting what are purely "works' costs?" If so, we shall be pleased to see the result, and to present it to our readers, in comparison with his £12 12s. 6d. for the electric arc lamps. At the present time, we fail to see what the electrical press have to crow about in connection with this report. They may see some virtue in getting a customer away from a competitor, even if there is no profit to be made out of him; but we cannot.

The discussion which has been in progress in the "Electrical Times" on the subject of station electrical engineers giving more attention to consumers' lamps, and educating them, on the lines which have been found so useful in the gas industry, has ended; and Mr. T. P. Wilmshurst, who raised the question, sums up this week. The most significant feature of the discussion, in his opinion, is that there is a growing recognition of the fact that electricity suppliers cannot afford to rest on their oars, but "must in some way or other meet the increasing severity of competition." The day has gone by when even the electricity consumer and his lamps can be left severely alone; and Mr. Wilmshurst and most of the engineers who have joined in the discussion admit that too great importance cannot be attached to keeping in touch with them. As has been recognized by gas managers, so electricity managers now see, it is no use leaving the education of consumers in the hands of shopkeepers and private contractors. If it is so left, they will never be educated. Gas managers will not overlook the fact that the electrical people are proposing to "wake up" and follow their example. "Imitation is the sincerest form of flattery." Under such circumstances, we can forgive the petty gibe contained in these words of the "Electrical Times:" Mr. Wilmshurst "cites the analogy of the gas companies who are beginning—now in their old age—to educate their consumers." What have the electrical people been doing that they have allowed gas suppliers not only to "begin," but to get (as the Editor of our contemporary knows as well as anybody that they have done) so far ahead of them in this matter? They will find a lot of leeway to be made up.

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**Masonic.**—At the Meeting of the Provincial Grand Lodge of West Yorkshire Freemasons, held at Huddersfield last month, Lord Allerton, Provincial Grand Master, conferred Past Provincial Grand rank upon a number of brethren; among them being Bro. W. W. Hutchinson, of the Friendly Lodge (No. 1513), Barnsley, who was invested as Past Provincial Grand Superintendent of Works.

**Manchester District Institution of Gas Engineers.**—We learn from the Hon. Secretary (Mr. H. Kendrick, of Stretford) that the next quarterly meeting of the Institution will take place at the Mosley Hotel, Manchester, on Saturday, the 26th inst. The *agenda* will include several important items affecting the future of the Institution, the completion of the discussion on the papers by Messrs. J. G. Newbigging and H. Kendrick held over from the February meeting, and a supplementary paper by Mr. W. Everitt, of Ilkley, on "Tar Fog."

**Exhibition Notes.**—To-morrow Mr. Alderman Pound will be invested with the dignity, and take upon himself the responsibilities, of the Lord Mayoralty of the City of London; and he has graciously acceded to the request of the Advisory Committee of the Institution of Gas Engineers to include the function of opening the Gas Exhibition at Earl's Court among his first public engagements. The opening will take place at 5.30 on Saturday, Nov. 19. We learn from Mr. Herbert Lees that the Committee of the North of England Gas Manager's Association have not been able to make arrangements for a general visit of members to the Exhibition; but a number are arranging to attend on the 30th inst. That day may therefore be regarded as the special one for the Association. Mr. George Helps writes to inform us that the Nuneaton Gas Company will be unable to finish their models for the exhibition, and so have withdrawn.

**The "Northern Star" Lodge.**—Lord Stanley, M.P., Provincial Grand Master for East Lancashire, assisted by the Provincial Grand Officers, formally consecrated the "Northern Star" Lodge of Freemasons at the Midland Hotel, Manchester, on Friday afternoon. The Lodge (as has already been intimated) has been founded by, and is intended for, gas engineers and the allied professions. It is questionable whether in the history of Freemasonry there was ever a lodge formed more auspiciously. Besides several members of Grand Lodge, there were 49 Provincial Grand Officers, and 183 Masons of lesser rank present. Bro. John Niven, P.M., P.P.G.Std.B. (West Yorkshire) was installed the first W.M. of the new Lodge; Bro. Robt. G. Shadbolt, W.M. of Lodge 362, was appointed S.W.; and Bro. S. R. Ogden, S.W. of 260, the J.W. The "Northern Star" Lodge is to meet four times each year. The oration on the nature and principles of the Institution was delivered by the Rev. J. G. French, Rector of Waterhead, Oldham, the Provincial Grand Chaplain. After the new W.M. had appointed his officers, notices were given of candidates to be proposed for initiation; and the usual banquet followed.

# THE LIGHTING OF DOCKS AND LOCKS.

To the "Man in the Street" whose business or movements do not bring him into touch with the requirements of the leviathan ships and smaller craft that traverse the seas, thoughts of docks and what is necessary in connection with them can scarcely ever arise. He passes through—let us say—London streets and large open spaces on which those streets converge, and he sees them magnificently lighted. He passes over London Bridge or the famous Tower Bridge, and sees the little blinking lights along the river side; but rarely comes the thought that there is anything anomalous in this. And the casual stroller at night time along the bye-ways that run from the main roads leading to the great docks by the river side lower down, while the surrounding gloom may impress him, is not struck by the fact that vessels large and small, and all with their freights in their degree valuable, come and go in the night, amid what, in these days of great excellence in artificial illumination, is a serious and imperilling deficiency of light. Slowly, however, but surely, the great dock companies are awakening to the fact that there is this deficiency, and in various ways they are amending it, to the satisfaction of all who have business with them.

Here is testimony as to what can be, and has been done. "In most of the important docks in the country," said Captain Salmon, the Dock Master of the Surrey Commercial Docks Company, to the writer the other evening, "the lighting is done by electric arc lamps or flat-flame gas-burners; but I have never seen a more splendid light than this for dock purposes." We were standing on one side of the New Greenland Lock, which has been built at considerable cost, in connection with the Surrey Commercial Docks, and which, without possibility of challenge, may be described as the finest lock that we now have in the Port of London. The "this" comprehended a fine installation of high-pressure gas lighting, which was the system chosen for the lighting of this magnificent addition to the maritime service of the port; and when it is mentioned that Captain Salmon has an intimate acquaintance with the ports of the world, the success of gas here in competition with the electricity supply of the Bermondsey Borough Council is a success indeed. The installation was the

work of the South Metropolitan Gas Company; and the Chief Engineer (Mr. Charles Carpenter) and his outdoor staff, with Mr. A. Stokes at their head, threw themselves very heartily into the work of justifying the confidence reposed in gas in fulfilling the responsibilities of such an important piece of lighting.

The responsibilities are great; and they might never occur to one who was not brought intimately into contact with them. While talking to Captain Salmon, he was directing the operations connected with the passage from the new lock of the good ship the *Margite Grodel;* and it was an object-lesson of the requirements in regard to lighting. Men were rushing hither and thither—passing across the tops of the lock gates, and along the dock sides, with its numerous capstans and ropes. But every rope and every single item of the equipment stood out as clear as in broad daylight. The work of opening the great lock gates, and the whole movement of the ship as she passed out could be seen with absolute clearness. It was pointed out how necessary it is, in dealing with smaller craft, that the huge basin should be lighted right across and well in to the sides; and the high-pressure incandescent gas-lamps were doing this admirably. Another necessity is the constancy of the light. There must be no uncertainty or danger of a breakdown when the light is most required; and, being exposed, the lamps must be capable of withstanding the stress of the severest storm. All these requirements the high-pressure lamps have been and are fulfilling, to the admiration and satisfaction of all concerned.

There are several special points about the installation that will interest the gas engineer; and we have to acknowledge our indebtedness to Mr. Carpenter for enabling the collection of these points. In the first place, there are no special gas-compressing arrangements at the docks, and none are required. The gas is brought right away at high pressure from the Rotherhithe Gas-Works of the South Metropolitan Company. One of the smaller holders there, with a capacity of 390,000 cubic feet, has been set apart for the purpose; and it delivers the gas into a special main at a pressure of 12 inches. Though, as the crow flies, it is not from the gas-works to the Surrey Commercial Docks such a great distance, the length of 7-inch main laid along Rotherhithe Street—a thoroughfare bounded by wharves and dry docks——is (owing to the windings of the river) some three miles. The main has already been tapped *en route* for lighting some of the smaller wharves and docks; and it is available for any customers who care to emulate the wisdom of the Surrey Commercial Docks Company. However, at the New Greenland Lock the gas is delivered at a pressure of 10 to 11 inches.

A pause should be made here to explain that, between the extreme gates, the lock is 550 feet in length; but the space lighted to the pier heads is about 700 feet long. The lock itself is 80 feet wide; and the lamps on the lock sides are set in a distance of 20 feet, so that between the lamps on the one side and the lamps on the other is a distance of 120 feet. Over the space the illumination leaves nothing to be desired. This does not take into account the illumination thrown by the lamps on both sides away from the lock; but—remembering that the basin is well lighted in the centre, 60 feet away from the lamps—the above figures will convey some idea of the total area that is illuminated.

The point at which the high-pressure gas is delivered to the Dock Company is in a small meter-house, in which is found a 300-light wet meter, by Parkinson and Cowan; but from here the distribution mains for the service of the lamps are a little intricate for comprehensive description. It may be facilitated if we at once explain that the dock is 40 feet deep and 80 feet wide; and that

under it there is built a culvert—so ⌊⌋, the entrance to which is only a short distance from the meter-house. From the meter to the culvert runs a 6-inch main (which may be designated A), which drops down the culvert 40 feet, passes underneath, rises 40 feet again, and ends a short distance away at a point where the gas from the mains on the southern side of the dock is controlled by a valve. Now the gas in this main has always the full pressure of the gas behind it—that is to say, 10 inches or thereabouts. From the entrance to the culvert on the northern side, a 3-inch main B is carried from the A main the full length of the lock with the pressure of the gas also constantly maintained in it; and this main is solely for the supply of the centre burners in each cluster. On the southern side of the dock, a similar main B is carried from A, and for the same purpose. Going back to the meter-house on the northern side, a little further beyond the point at which A main leaves the meter, a second main C is carried, and its connection with the main under pressure is controlled by a hand valve. From the main C is also carried a 3-inch main D the full length of the dock; and this main supplies the remaining burners in the lanterns. On the other side of the lock, a secondary 3-inch main D is similarly carried, and also controlled by one valve; so that on either side there are a pair of 3-inch mains. If, however, we confine our attention to the two mains, and their purposes, on the northern side of the lock, the description will suffice for those on the southern side. The 3-inch B main, as explained, only supplies the centre burner in each lamp; and in the base of each column is a locked door. Inside is one of Mr. Carpenter's patent bye-pass taps, and in the lantern one of his flash-jets. By means of the patent tap and the flash-jet, the lamplighter lights up only the centre burner from the main in which the 10-inch pressure is always sustained. This light suffices for ordinary purposes when work is not proceeding. The second 3-inch main D is always charged with gas, and can never become exhausted, although the valve in the meter-house is closed; this being accomplished by a mercurial seal below the remaining burners.

When the valve is turned off in the meter-house, the seal at the burners is closed; when the valve is turned on, the pressure of the gas opens the seal, and the remaining burners are ignited from the centre one. It will be seen from this that the whole of the burners on the northern side, except the centre one in each lamp, can be immediately ignited and extinguished from and by the one valve in the meter-house; and the same applies on the opposite side of the lock—the lamps there being similarly controlled by one valve. The convenience of this where such important operations are carried on, and where time is valuable, will be appreciated. For the purpose of identification, the A and B mains and the stand-pipes leading from the latter are painted white, and the secondary mains C and D red.

Up to the present, we have omitted description of the lamps themselves. Altogether there are fourteen of these, seven on each side of the lock. The columns themselves (which were specially cast for the "job") are of noble design, and ornamental. They are 16 feet high from the ground level, and 18 feet to the burners. The lanterns stand on a metal base, mounted on ball bearings, so that they can be revolved by hand for cleaning purposes. The two lanterns on the pier heads and the two at the extreme ends of the lock are octagonal in shape, and larger than the intervening ones, which are of the hexagonal type. The bottoms of the lanterns are made perfectly wind proof; the air supply for the burners being brought in at the head, and distributed through the

lantern between the edge of the white enamelled steel reflector and the frame of the lantern. Considering the number of burners in each, the lanterns are of small size; but, being glazed with Siemens hard glass, no difficulty from the heat has been found. The ribs of the lanterns are specially constructed; and an air-tight joint is secured by the use of asbestos ribbon between the glass and the members composing the rib. Perhaps the greatest proofs of the effectiveness of the lanterns is that, their exposed position notwithstanding, the light is absolutely steady, and so far the average of mantle renewals has not been more than five or six per week, which is excellent for sixty burners and a gas pressure of 10 inches. This reminds us that on these lamps and for their other high-pressure lighting, the South Metropolitan Company are using uncollodionized mantles; and their experience is such that they are not likely to revert to the usual and their former practice. This low mantle renewal is a consideration when maintenance is the rule, at an inclusive figure. However, that by the way. In each of the four large lanterns, there are five burners, and in the ten smaller ones four burners, or in all 60 burners. As each burner consumes about 15 cubic feet per hour at (say) 10 inches pressure, and the illuminating power is calculated at 30 candles per cubic foot, we get, when the whole of the burners are alight, for a consumption of (say) 900 cubic feet per hour, an illumination equal to 27,000 candles uniformly distributed over the new lock, sides, and adjacent parts, without any dark spots. The lamps are about 95 feet apart, and 20 feet from the edge of the lock; so that they do not interfere in the slightest with any of the operations, and yet over the whole face of the water, there is light.

This demonstration of the power of high-pressure gas-lights is a splendid one; and it is an example to the owners of wharves and docks, not only on the Thames but elsewhere, which cannot fail to impress them. If "time is money," so is a good light to those who have to berth and despatch ships in the night. The Port of London has, we have long been told, lost some of its prestige. The Surrey Commercial Docks Company are doing their best in trying to recover a part; and in their efforts gas is sharing, and bids fair to share to a still greater extent.

## THE LARGE GAS-WORKS SCHEME FOR NEW YORK CITY.

(*Concluded from p.* 321.)

The photographs which follow those already published have not that interest which the previous ones have possessed. But a selection is given just to show the position, on recent dates, of the work beyond the retort-houses.

To the rear of the retort-houses is the boiler-house, with its fine bold chimney. The building (shown in the first picture) is some 94 feet long; and its position in relation to the other houses and plant will be seen by the plan and the third photograph published on Oct. 18. The architectural features, it will be observed, are in complete accord with those of the inclined retort-house. Water-tube boilers have been adopted. To the right and left of the boiler-house, and running towards the southern boundary, are the washer-houses, which are each 132 ft. long by 74 ft. 8 in. wide. The second view shows the position of the erection of the east house on the 2nd ult.; and the third photograph the condition of the west house the same day. The work is sufficiently advanced to show that these buildings will possess good and clearly defined exteriors; and that, seeing the number of window-frames in evidence, there will not be any deficiency of light inside. Some of the other buildings were not far enough advanced for photographing before Dr. Elliott left New York. A fairly good view, however, of the purifying-houses to the

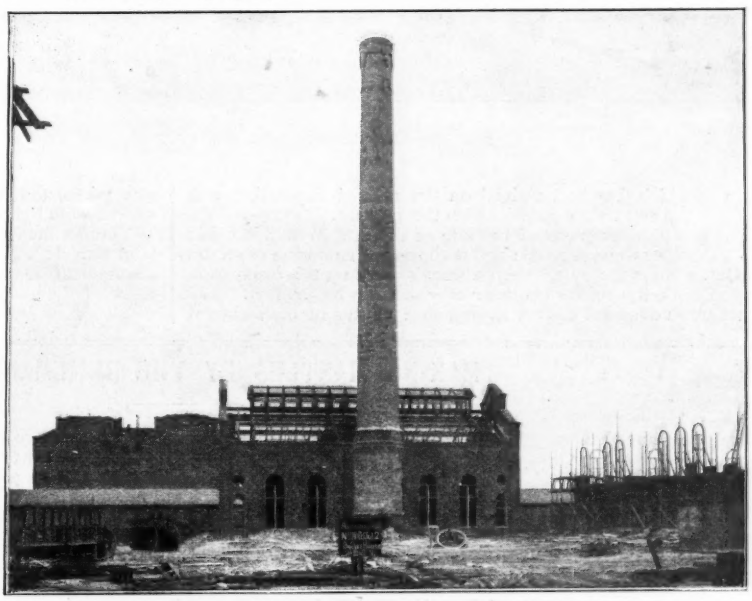
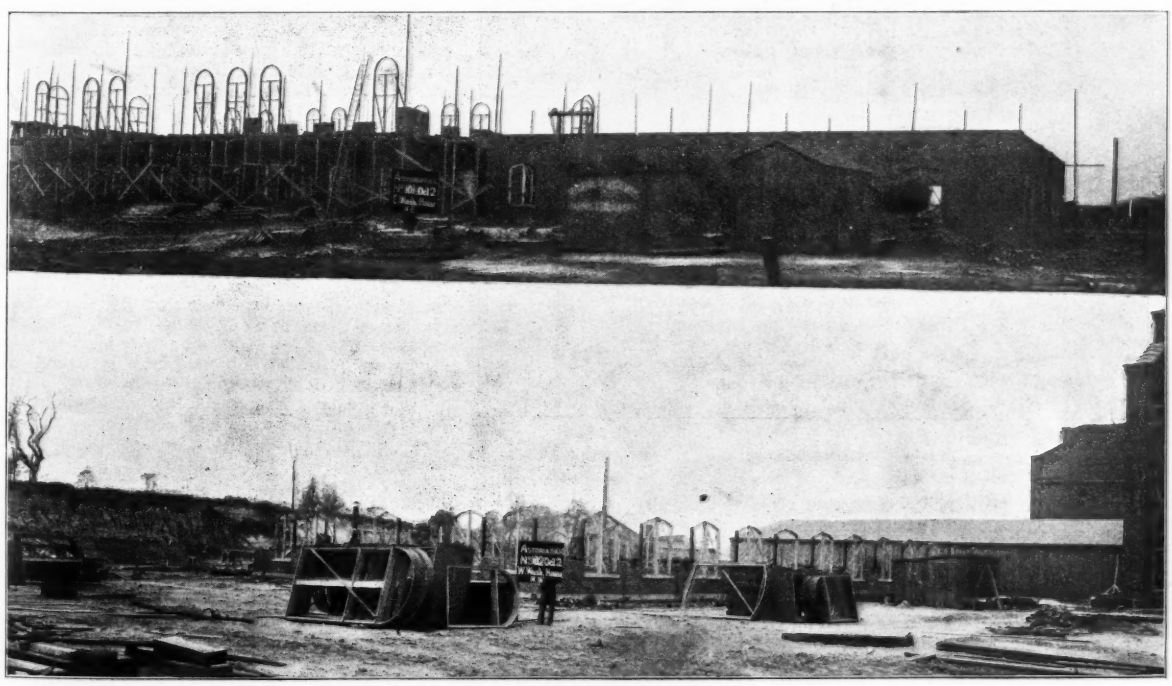


Fig. 1.—The Boiler-House on Oct. 2
(The Southern End of the Inclined Retort-House is seen on the Left-Hand Side.)



Figs. 2 and 3.—The Position of the East and West Washer-Houses on Oct. 2.

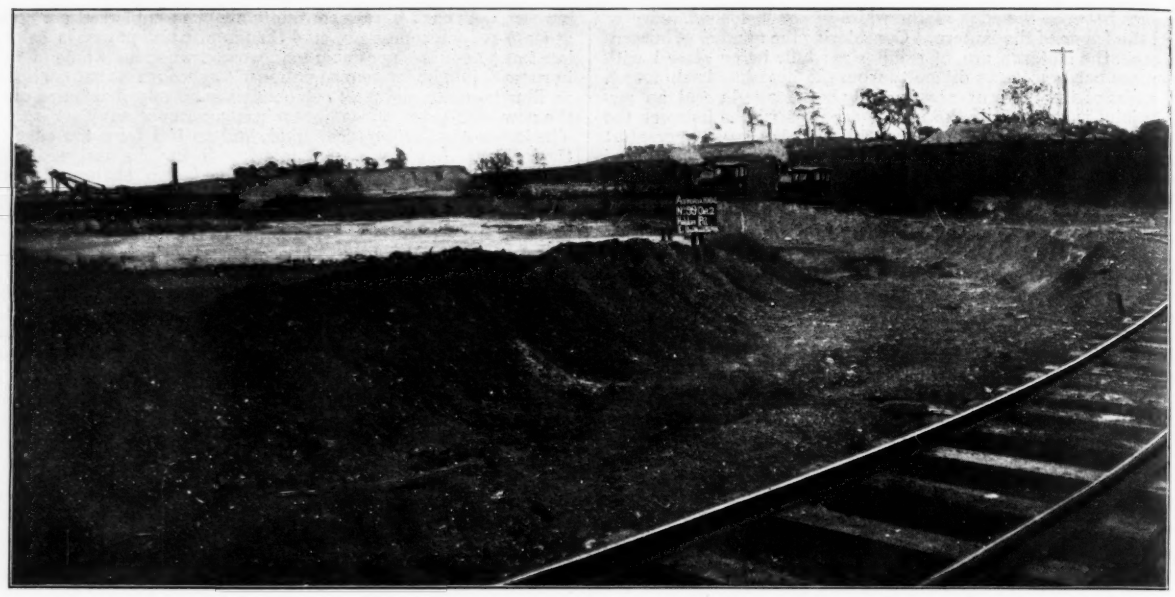


FIG. 4.—COMMENCING THE EXCAVATION FOR THE GASHOLDER TANK.

stage at which they had arrived on the 12th of September was given in the third view published on the 18th ult.

The last photograph is of the site of the first 20 million cubic feet gasholder to be erected; and it shows the condition of affairs on Oct. 2, after there had been a week's work on the excavation for the tank, the inside diameter of which will be 300 feet. The photograph does not convey it, but, as a matter of fact, when it was taken, the trench had already been carried to a depth of 12 feet—the light sandy character of the soil assisting rapidity. While this means ease in excavation, it also means anxious care later on. It will be observed that to the rear of the view is a mechanical digger which is being used on the work; and to the right of the picture are a pair of locomotives which are being employed in drawing away the material.

## MAKING MANTLES BY THE BUHLMANN PROCESS.

"I DO not claim that we get higher illuminating results, but we do get an increased durability." This was the statement made to the writer by Mr. J. H. Sheldrake, the General Manager of the Buhlmann Incandescent Syndicate, Limited, who are the sole proprietors in Great Britain and the Colonies of the Buhlmann and Lenz patents for the manufacture of incandescent mantles. At its best,

FIG. 1.—IMPREGNATING THE FABRICS.

the incandescent mantle is a thing that requires care and protection, though the power of its endurance if properly made is greater than most people imagine who have not tried the system of lighting, or who in their prejudice are glad to hide its greatest virtues behind what is its one weakness if violently treated. If, therefore, in the process of manufacture, anything can be done which will impart strength without impairing the illuminating power of the mantle, then it is to be welcomed. Well, the whole of the Buhlmann patents and the appliances that the inventor of that name has devised for use in the manufacture of mantles have nothing whatever to do with the fabric base or the impregnating fluid (those are the same as in the manufacture of any other mantle), but they are entirely concerned in the treatment of the mantles in the process of production. And it is, we are assured, these methods of treatment which give to what are known as the Buhlmann mantles the increased strength claimed by the inventor and Mr. Sheldrake, and supported by the tests of trained experimenters and the practical experiences of users.

It may not be generally known that the manufacturers of incandescent mantles in this country can be counted on the fingers of one hand—that is to say, unless there are one or two little makers of whom we have not heard. The Buhlmann Syndicate are one of the home makers; and they have established themselves in an extensive factory in Weston Street, Bromley-by-Bow. The premises seem destined to have something to do with light; for before mantle manufacture was commenced in them, Messrs. Bryant and May (who, by the way, have become famed not only for their matches, but for exhorting people to "support home industry") were in occupation, and carried on the match-splint branch of their business here. It was in the office of the General Manager, situated in the block of buildings just by the entrance gates, that that gentleman was talking to the writer about the strength of the Buhlmann mantle; and through the windows one could see the exterior of the several buildings where the different operations are carried on. Further conversation elicited the fact that the works cover an area of 1½ acres; and that the various shops are capable—complying with the Factory Act—of accommodating altogether 760 persons. It would have been difficult to have found a "ready-made" factory so excellently adapted for incandescent mantle manufacture. Most of the buildings are only one storey high; and they fitted in splendidly with all the requirements and regulations of the London County Council.

What had been heard of the Buhlmann mantle, and Mr. Sheldrake's statement quoted as the opening passage to this article, were sufficient to make a run through the factory a matter of interest. Crossing the yard, the laboratory is first entered; and it is found to be replete with appliances for testing everything, from the various chemicals to the completed mantles, for their lighting value and life. Ranged on one side are the large bottles containing the nitrate of thorium and other chemicals and fluids; and, on the other side, is a photometer, and adjacent to it a large gas-pipe carrying a number of burners, all fitted with mantles and alight. These are the mantles whose lives are being spent in proving the longevity

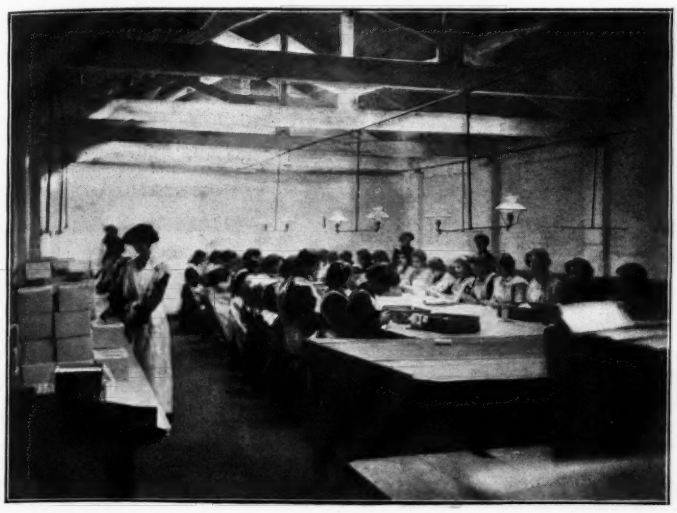


FIG. 2.—THE SEWING-ROOM—FORMING THE HEADS OF THE MANTLES, AND SUPPLYING THE ASBESTOS THREAD LOOPS.

of the Buhlmann progeny. Some of them have been burning many thousands of hours night and day, with only the intermissions occasioned by their periodical photometrical testing to ascertain whether, and (if at all) when, the lighting power diminishes. The results are all duly registered; and this—besides giving the makers assurance as to their process of manufacture being an effectual one in the matter of procuring strength—affords a regular test of each batch of fluid, and the best results obtained serve as the standard up to which work is conducted. The highly incandescent mantles are examined, as are also the attached cards recording the life-history of the mantle—when first put on the burner, when photometrically tested, and the number of hours continual use up to a certain date. One mantle avowed a life of 3960 hours, another 3408 hours, a third 4776 hours, a fourth 2136 hours, a fifth 2904 hours, a sixth 1800 hours. These were taken indiscriminately from a line of burners, and all of them showed signs of a continued useful existence. The average of the illuminating power records may be taken as 81 to 83 candles at the start, and 75 candles is registered as being maintained up to 1000 hours; the average consumption of gas being 4·1 to 4·2 cubic feet per hour. There is one little point of danger about the publication of these tests for the length of resistance to the strain of constant use; and it is that some buyers, without consideration, may be led to expect to get the same working life out of them as is obtained in the laboratory. But this can be put right by explaining that these mantles to which we have been referring are not subjected to the vibration, intermittent use, and other destructive influences that mantles in street-lamps, workshops, and other places are, as a rule, exposed to; but to the extent that these mantles with the noteworthy laboratory career exceed, in respect of durability and maintenance of light, mantles of common make tested under like conditions, they will also similarly exceed them in service under other conditions that correspond in severity.

Passing through the meter-room—in which it is noted that a 4-inch service is required to one meter to provide gas for the burning-off room, and that there are other meters for the service of a Crossley gas-engine and the general lighting—the impregnating-room is entered; and there we find the first process of manufacture proceeding. The mantle fabrics or stockings are saturated with the impregnating fluid; and they are then squeezed through rollers—one of vulcanite and the other of india-rubber—so as to leave in each mantle an exact and uniform quantity of fluid. Continual tests are applied in order to see that each mantle is put in possession of the prescribed quantity of rare earths. The machines (which will be seen in fig. 1) are driven by overhead shafting and gearing. After passing through the rollers, the limp saturated fabrics are suspended on glass rods fitted into frames, each frame holding four of the rods, and carrying about 60 mantles. The suspension of the mantles in this way on glass rods is a variation from the ordinary practice; the mantles, as a rule, being fitted on to wooden cones. The objection has been urged to this system that the fluid will run to the ends of the fabrics; but this has been found to be erroneous. A strong solution is used; and the squeezing to which the fabrics are subjected causes all the threads to be well soaked, and each capable of retaining its proper proportion of fluid. It is difficult to see why it should be thought that the fluid should run more through this suspension than by fitting each fabric on to a cone, which absorbs more time. However, along one side of the impregnating-room, is a long slip apartment—some 60 feet long, in fact—called the drying-room. This room is fitted with racks to take the frames holding the wet mantles, and the racks are capable of accommodating at one time 12,000 mantles. The room is maintained at an equable temperature by some 550 feet of 2-inch steam-tubes running beneath the racks; this system of heating being easy to regulate. The passage of air into and out of the room is kept constant through a fan working at a high velocity; the fresh, dry, warm air, always flowing up in and among the mantles, quickly and effectively accomplishing the drying. In a succeeding room, the heads of the mantles are chemically treated, so as to strengthen them. The mantles are now ready for forming the head by sewing, and supplying the asbestos loop for their suspension on the rods; and entering a room some 80 feet long (fig. 2), a number of girls are found at this work, which requires a considerable amount of care and skill, and the supervision of a forewoman, whose duties are to continually see that the work is being done in a proper manner. Temperature plays an important part in the making of mantles; and while in this room a note is made that the factory throughout is heated with 5-inch steam-pipes, through which live steam is passed, so as to maintain the temperature in all weathers.

If there is one room more interesting than any other, it is the burning-off room, in which the Buhlmann process is carried out to perfection; and some little time was spent here. The main room is some 100 feet long; and, as the photograph shows (fig. 3), there is an abundance of spare space for increasing the output as soon as the demands require. Altogether there are at present 21 machines in position, each of which is capable of turning out 900 mantles per day of nine hours—in fact, this number is often exceeded by some of the best hands. The Buhlmann patent-burning-off and hardening machine has been described in times past; but the essential feature of its operation is that it subjects at one time the whole mantle to the action of flame, both in the burning-off and hardening processes—this being effected by the mesh construction of the cone burner head, which gives a uniform flame from the base to the apex all round the cone. The machines here are fitted with four burners apiece, which enable each girl to burn off four mantles simultaneously. Incidentally, too (further reference to this will be made presently), it may be mentioned that, instead of the gas being supplied to the burners under pressure, in this system it is the air that is supplied to the burners at a high pressure. Subjected to the special treatment just lightly touched upon, it is found that the resulting mantles are exact in diameter (this being, of course, a most important factor in the incandescent mantle), and that they have great flexibility. Shocks, too, by the testing-machine (fig. 4) are proof of their toughness, speaking, of course, in a comparative sense. Allusion has been made to the air being supplied to the burners at high pressure; and this has also an important effect on the temperature of the room. It must follow that, unless special provision is made, a number of burners in operation with blowpipe-like intensity in a room, will have a deleterious effect on the atmosphere, and be both uncomfortable and injurious to the operatives. A ventilating-fan in the roof (for removing the products of combustion) is only one means of securing ventilation and maintaining the purity of the air. In an adjoining room is found a blower, driven by an 8-horse power Crossley gas-engine, which sends air at a very high

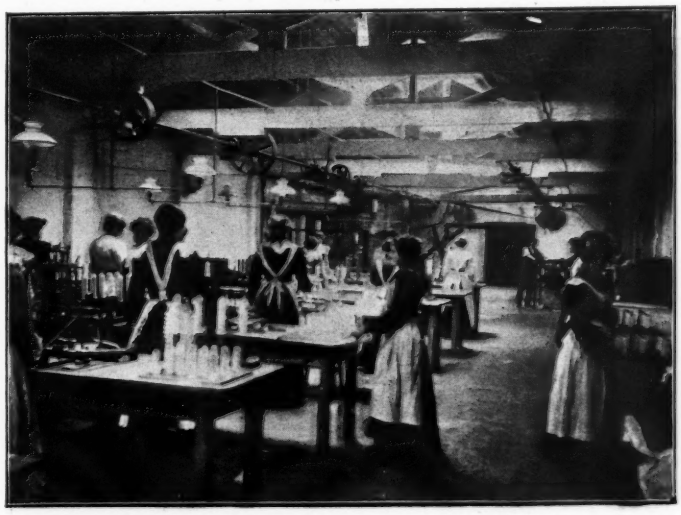


FIG. 3.—BURNING OFF AND HARDENING THE MANTLES BY THE BUHLMANN SYSTEM.

pressure into the mains which feed the burning-off and hardening machines, through the centre of the burner. This constant rush of air at high pressure through the burners causes a brisk upward current, and perpetually produces the renewal of the air of the room. The temperature is anything but unpleasant; and the girls bear testimony to the fact that, even in the height of summer, they experience no discomfort. It ought to have been remarked before that prior to being burned off and hardened, each mantle is stamped with the Company's name.

Looking at fig. 3 once more, it will be observed that the mantles, after being burned off and hardened, are suspended on supports carried by wooden frames (two dozen mantles on each). At the far part of the room is seen the end of a band conveyor, made of an endless cotton belt, 2 feet wide, running on steel rollers. On this conveyor, the frames holding the mantles are carried through a tunnel-like passage across to the collodionizing room, which is separated from the other portion of the factory. The conveyor is some 120 feet long, is continually at work, and is, remarks Mr. Sheldrake, a source of great saving both in labour and loss by breakage. The end of a conveyor delivers on to a receiving-platform in the collodionizing room, as seen in fig. 5. The photograph also shows the dipping-machines containing the collodionizing or stiffening solution. Each machine (of which there are four) is fitted with four small rectangular tanks, set far enough apart for the bars of the wooden frame passing down between when the mantles are being lowered into the solution. The outer portion of the wooden frame is supported on an iron frame; and, on the girl turning a handle, the frame descends, and gives the mantles a thorough immersion. On the handle being reversed, the mantles are again raised, and are allowed to stand a short time to drain. The frames are next placed in racks, constructed over steam-pipes, and are left to dry. When dry, the mantle-laden frames are placed on the return of the conveyor, and are transported to the trimming and packing room, one corner of which is shown in fig. 6.

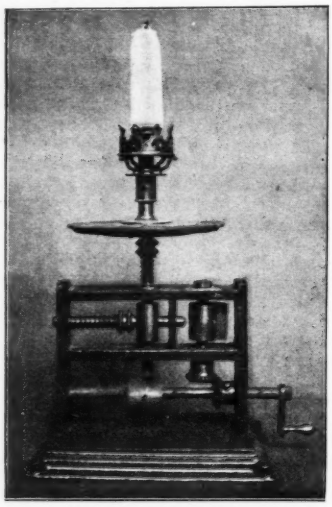


Fig. 4.—A Shock Machine, for Testing Durability.

The interesting feature of this room are the Buhlmann trimming machines. These (which each carry eight mantles at a time on cone-shaped supports) are constantly revolving; and, as the mantles pass round, they come in contact with a knife at the back of the machine which trims the whole of the mantles to an exactly uniform length, according to the length of mantle being made. One stays to admire the ingenuity of these machines, and their simply produced precision. It is certain that the old process of trimming mantles with scissors is doomed. It is observed that one girl feeds the machine, and another takes off and places the mantles in boxes; and the girls are kept busy, seeing that each machine is capable of dealing with 10,000 mantles a day. From this point, the mantles are transferred to the tender care of the packers, who make them comfortable and secure by protecting their heads with cotton wool. The cylindrical cased mantles are then packed in outer cases in dozens.

Fig. 5.—The Colodionizing-Room.

There is the Buhlmann mantle ready for sale. The plant already installed and here described is equal to the production of from 8 to 10 millions of mantles per annum. Arrangements, it may in conclusion be remarked, have just been made by which the Syndicate will be represented among gas companies by the Richmond Gas Stove and Meter Company, Limited, Messrs. Thomas Glover and Co., Limited, and Messrs. R. & A. Main, Limited.

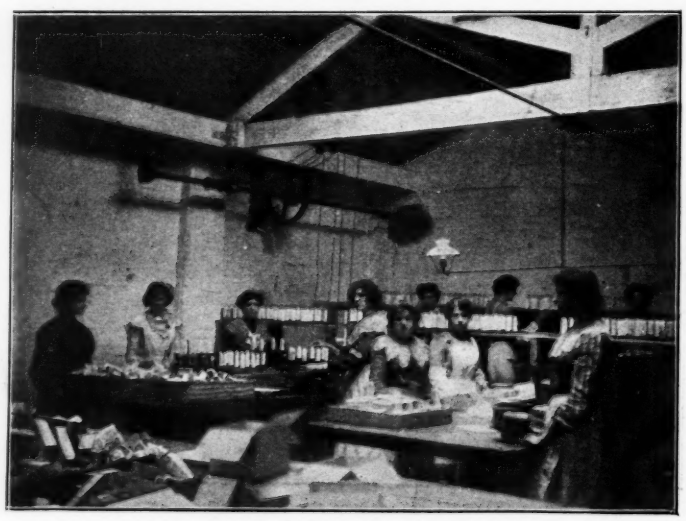


Fig. 6.—The Trimming and Packing Room.

**The Late Mr. G. T. Myers.**—In the "Journal" last week we announced with regret the death, at Saltcoats, on the previous Saturday, of Mr. G. T. Myers, formerly of Broughty Ferry. After his relinquishment of his position of Gas Manager there, he went to reside at Smethwick (the home of his daughter), where he made many friends. The following additional particulars of his life-work appeared in the "Smethwick Telephone" last Saturday: "Mr. Myers was born eighty years ago in the village of Marykirk, in Kincardineshire. On leaving school, he worked for three years as an apprentice in a small engineering and millwright works, and next served the two remaining years in a large engineering works near Dundee. His skill and care as a workman were early recognized by his employers, and at the youthful age of twenty-one he was selected to proceed to Moscow to erect the carding and spinning machinery in a large jute manufactory. He was in Russia two years, and on his return home he found William Murdoch's discovery of the process for producing gas from coal had begun to make progress, and arrangements had been made to build gas-works at Broughty Ferry. His employers were among the largest shareholders, and they at once obtained for him the appointment of manager. His practical skill as a mechanic stood him in good stead; and the new works, like few gas-works in the early days, were a complete success from the start. The borough grew rapidly, the demand for gas increased, and the numerous additions from time to time were as skilfully carried out as the initial machinery and plant. How highly his abilities were appreciated may be gathered from the fact that on his retirement, after forty years' service, the Town Council unanimously voted him an annual allowance of two-thirds his salary. Throughout his long career the Gas Committee rarely, if ever, discarded his recommendations, and very few instructions were ever given him. His body was interred at Barnhill, Forfarshire, last Tuesday, amid every manifestation of respect by a very large gathering of relatives and friends." The late Mr. Myers's connection with the formation of the North British Association was mentioned last week. We have only to add that he was elected an honorary member in 1898; and, in this respect, he enjoyed a distinction held by a few only of his peers—the total number of such members being less than half-a-score even at the present time, though the North British is one of the oldest of the Associations.

## IMPRESSIONS FROM AMERICA.

It is not given to many to be able to journey and see the wonders of the earth in its distant parts, nor to all to see even a tithe of what is worth inspecting in their own country. Therefore the great majority of the human race have to be content with reading the descriptions and impressions of those who have seen what they cannot themselves set their eyes upon, and to gain their knowledge of such things from what they read and from the product of the photographic art. They have to see, as it were, through the eyes of other people. That is instructive, but not altogether satisfactory, because reading and viewing pictures can never completely give to a man what he can secure by personal sight and observation. There is always something lost between the two, and that something is the image which the memory takes possession of through the eye, and which has a greater permanence than the memory of written description, even pictorially illustrated.

In the last few issues, we have been publishing some views of, and a little descriptive matter concerning, the magnificent works which Mr. W. H. Bradley is erecting for the Consolidated Gas Company of New York; and we venture to say that the British gas engineers who are best qualified to talk about these works—perhaps not to the extent of giving minute details—are not of those who have merely read, but those who have seen. Mr. H. E. Jones, Mr. C. E. Botley, and Mr. R. O. Thompson, of Melbourne, may be named; they having been the sole representatives of the British gas profession taking part in the recent engineering visit to America. Mr. Jones, in conversation after his return, was very enthusiastic regarding the great kindness that the engineering visitors received throughout the journey at the hands of their American *confrères;* and he circled round the delights of the trip until he alighted on the big gas-works creation which is proceeding on Long Island. To those who have not had the privilege of seeing the works, but only reading of them, Mr. Jones's impressions may hold interest. In his view, the works are well planned. The access of coal to the works is from the navigable East River on the northern side. Situated immediately beyond the docks is large storage for the surplus deliveries, following upon which are the two retort-houses of Mr. Bradley's choice—one for horizontal retorts charged by machinery, the other for inclined retorts. Succeeding is a wide and open coke yard before the plant for exhausting, condensing, scrubbing, and purifying is reached, which is all planted clear away on the opposite side of the space allowed for coke. Then there are the station meters, which are placed, as it were, in the angles formed by the intersections of the circles of the gasholders. This planning makes the progress of the coal into the works to the coke ground very direct and simple, and keeps all the dirt and dust arising from gas manufacture away from the machinery and the cleaner processes of purification. As successive sections are in process of installation in parallel with each other, it follows that the coke space will form one grand avenue running from west to east. This avenue, says Mr. Jones, is of admirable width, and of length conforming with the number of sections to be built; so that it preserves abundant space for the accumulations of coke and ample thoroughfare to all parts of the plant—on the right hand walking eastwards being the plant dealing with the crude gas after it is produced, and on the left hand all the coal handling and carbonizing plant. At one end of the site where the boundary of the land is less rectangular, and suitable for wharf frontage, a carburetted water-gas plant is being installed—oil being capable of being pumped to it with great facility from the distant wharf, and coke being readily available from the grand avenue. The water gas will also be carried across the avenue to its own purifying plant.

The simplicity of the plan, the provision of the great area for coke, and the liberal access to all parts of the works, are all matters which particularly impressed Mr. Jones. Other subjects of great interest to him were the foundations, especially of the outer wharf wall, which was being constructed of rubble work, within timber camp-sheathing. This very cheap form of construction encloses a considerable area between high and low water line, and gives necessary jetty accommodation for the reception of coal and other material. Of course, the site alongside the East River has presented many problems in foundations, all of which, in Mr. Jones's opinion, Mr. Bradley and his accomplished second (Mr. Addicks) have dealt with not only cheaply, but very expeditiously. The buildings, too, have been going up at a rapid rate, as is easily seen from the photographic records taken from week to week; the speed transcending anything that Mr. Jones has knowledge of on this side. An enormous and high gantry was a feature of interest to the visitors. This was being used for elevating the steel stanchions, between which were being formed the walls of the buildings, and for lifting and fixing the girders and roofing above them. Then there were the gasholders, which are all to be on an exceptionally large scale. These have been contracted for at very moderate prices, comparing well with the recent practice of Sir George Livesey—and, we may add, from what is known of it, of Mr. Jones too. If Mr. Jones recollects rightly, the price works out to well within £8 per 1000 cubic feet, including the tank.

The works mentioned, extensive and difficult as they are, do not, Mr. Jones ran on, exhaust the list of responsible scheming which has had to be encountered and dealt with by the Engineer. For example, the gas he is making at these works has to be transferred to the other side of the East River; and a tunnel is in consequence being constructed, which, for resource and engineering ability, is not inferior to the tunnels driven under the same river by the Rapid Transit Company between New York and Brooklyn, and which tunnels were visited by the engineers from this side. The Gas Company's tunnel is to be something like 1½ miles in length, and will carry two steel mains, each of 5 feet diameter. This tunnel, says Mr. Jones, is an illustration of the big view with which one has to regard everything American. Never has he heard of any tunnelling corresponding to it in this country or in Europe for gas purposes. It is going to cost a lot of money too. Speaking of costs led Mr. Jones to remark that the whole of the contracts for the new gas-works are being carried out by American firms, with the sole exception of the inclined retort settings, which are the work of the Stettiner Company.

Running off into a vein of general comment upon gas practice in America, Mr. Jones said that in the New York Gas-Works, as in others at Chicago, the horizontal retort predominates. Gasholders are built, too, with light steel frames, and are identified very much with modern London practice. Tanks also are carried out in concrete; and so likewise conforming with the latest of London practice. The march of water gas in America has, he thinks, to a certain extent been curtailed. The impression gathered in New York was that, where facilities for the access of coal and the egress of coke were good, superior economy is for the time being with coal gas. Then in travelling through the States, it was clear to Mr. Jones and his companions that gas is holding its own, even where electricity is abundantly supplied. In New York, the supplies of electricity and gas are under the one Company; and gas there is far from being pressed for lighting, domestic fuel, and power purposes. In other parts of America and Canada, the existence of large waterfalls which can be converted into power by turbines put electricity into the hands of enterprising financiers at such a rate that gas is not there in such a good position to compete as in this country. Nevertheless, even in Ottawa, where Mr. John Coates (who entertained the three gas visitors, and who is identified with the supply of gas there) has to contend with the provision of electricity from natural water sources, gas retains its ground very well. True, observed Mr. Jones reflectively, it is not advancing by leaps and bounds as it is here, where the working-class population takes to the use of it. Going back to New York for the moment, the outskirts are lighted by incandescent gas-burners, though many of the main streets are illuminated by electricity; and the same may be observed in most of the towns visited by our trio of gas engineers. Evidently such a condition exists that a *modus vivendi* has been established even where electricity is being supplied from such a cheap source as water power. The domestic habits of the Americans and Canadians are so luxurious and lavish, that they do not grudge expense; and therefore the travellers found, in the houses and hotels visited, a greater use of electricity than gas. This Mr. Jones attributed to the "disregard of the items of personal or domestic expense characteristic of the American people."

At Niagara, the voyagers saw two enormous power-houses—one on the Canadian and the other on the American side—both of them for generating and dealing with hundreds of thousands of horse power. It may be said that water power turned into electricity seems to dominate most of the work that is going on. When the St. Louis Exhibition was reached, however, it was clear, from the exhibits of gas-engine makers, that the use for power of gas in internal combustion engines is actively progressing there as in this country. There were quite half-a-dozen makers exhibiting gas-engines of all scales—chiefly of the smaller sizes, but some of them running up to enormous powers. The Westinghouse people especially were showing some notable sizes of gas-engines.

There was another matter which impressed Mr. Jones very strongly, and that was the status of the gas engineer in America; and, in his conversation, he dilated quite eloquently upon it. When in New York, he was particularly gratified to find Mr. Bradley and Mr. Addicks both regarded by all the important engineers—the civil and mechanical engineers—in the light of the fullest respect; and then Mr. Coates, of Ottawa—"why he is quite a power in the land! His position is shown," said Mr. Jones (the reminiscence was evidently a pleasant one), "by the fact that he was able to introduce us to persons of distinction at a great garden-party, where the *élite* of Ottawa were assembled—all coming and going in a perfectly friendly manner." In short, he heard, on all hands, gas men, and others in similar position, spoken of with the utmost consideration. Most of them are members of the leading technical societies; and many of them are graduates of the universities, and are endowed with diplomas of merit by examination. Judging, too, by what he saw, Mr. Jones came decidedly to the conclusion that American gas engineers are well and honourably treated by their employers. Their professional abilities are recognized, and properly paid for. This is a matter that shows up well in America—if a man is useful at all, he is always well remunerated, which enables him to maintain a good social position, besides making provision for old age. Herein, Mr. Jones is of opinion, there is matter for many British gas administrators to reflect and act upon.

A few words from Mr. Jones's concluding expressions concerning his pleasant recollections. Throughout the trip, the kindness and thoughtfulness of the Americans were inexhaustible. They not only carried the visitors over their railways free, placed the tramcars at their service, fêted them, but throughout there were

the warmest imperial sentiments expressed in Canada, and the most friendly political sentiments in America. Sir William White, the President of the Institution of Civil Engineers, made a number of charming and cultured speeches everywhere the members went. "You ought," advised Mr. Jones, "almost to call him an ambassador; for throughout his speeches there was a tone of imperialism and brotherly feeling towards his fellow professional men on the other side; and he was always cheered to the echo." Sir William was chosen to give an address to the engineers of all nations at the congress; and he wound up his speech with a very eloquent figure, representing the profession of the civil engineer as one which is rooted in all the sciences like a noble tree which reared its trunk in the effort to raise the condition of mankind by its works—promoting transport facilities and working for civilization—and with its branches ramifying off into all the specialites which combine to make the whole profession of the civil engineer. These are of the things which, going to see and hear for himself, have impressed themselves ineffaceably on Mr. Jones's memory.

## TESTING INCANDESCENT BURNERS & MANTLES.

By Jacques Abady.

The remarks which follow are prompted by a communication from Mr. Victor Rettich in last week's "Journal," and by the characteristically practical editorial comments upon the subject. There appear to me to be three salient points in your correspondent's notes—firstly, a lamentation as to the exaggeration of results by interested parties; secondly, a suggestion of a standard testing bureau; and, thirdly, a belief in the utility of the prescription of a standard set of conditions for testing incandescent burners and mantles.

Now, I fully share your reprehension of the practice of issuing wild statements incapable of proof; but it seems to have been forgotten that Lord Bramwell's dictum as to highly-paid experts (and I am afraid in the matter of burner reports they must all cry "*peccavimus*") applies also to mere merchants and manufacturers. It is also overlooked that incandescent gas-light resembles moonlight in more than the quality of its illumination—for, like moonlight, it engenders romance—and of romantic statements we have surely had enough and to spare. I do not see for the moment how the establishment either of a bureau or a set of standard conditions can affect this aspect of what is, after all, merely a nuisance; for my view is that neither the one nor the other is necessary, desirable, or possible.

Firstly, as to a "Bureau of Standards." If it were possible to get a standard set of conditions, then a central bureau might possibly be of some microscopic service. Its utility is certainly not analogous to the cases of electric lamp or yard measure testing cited by Mr. Rettich, because these latter consist of stable and definite factors. We have only to look at the essentials to incandescent gas-burner testing to see how different is the case there; and so we can dismiss this suggestion as impracticable. What I want, then, to try to show is that the establishment of a standard set of conditions for incandescent gas-testing is (1) not desirable, and (2) not possible.

(1) Assume for a moment it is possible to prescribe a standard set of conditions, what object would be gained? If precise directions as to the mantle to be used, the burner to be employed, quantity of gas, air supply, &c., be issued, what will it avail me, who make a certain type of gas, to test my burners and mantles by this method, when I have found that another method suits my gas very much better and yields far better results? Is it not the aim of every gas manager to supply the best light he can to his consumers, and how is he helped in this direction by the knowledge that the "proper" efficiency of a particular mantle is (say) 18 candles per cubic foot and a candle-hour for 34 calories, when he can get by his own method of adjustment 22 candles per cubic foot all the time and a candle-hour for only 30 calories?

If the established standard is meant to guide inventors of burners and mantles, how obvious is it that, far from doing this, it would only push invention in a groove and stifle novel ideas and new methods. If "lighting gas" were a constant of definite composition, then a standard method would be analogous to a standard method of testing an electric lamp. But meanwhile it is not; for 200 watts means 200 watts, whether produced from slack or from anthracite; but the expression 600 British thermal units hardly ever means the same bulk, pressure, and heat. I should have thought, with all due respect to the Zurich Congress and others, that the lesson of what a standard luminous flame has done for the gas industry would have been sufficient warning. Is it not a fact which he who runs may read, that the "5 foot rate" and the argand burner have totally stifled all attempts to increase the luminous value of gas without a proportionate increase in cost, have rendered commercially valueless all attempts to improve luminous-flame burners; and is it not a fact (though not so generally known), that when the first rumour went abroad of possible alterations in testing methods, argand burners were produced which vastly increase the light yielded by the hitherto known testing burners?

These are incontrovertible facts; and my deliberate opinion is that any attempt to set up, officially or otherwise, a standard set of conditions for testing incandescent burners will have similarly retrograde results. I fail to see even how such a standard would amend the advertising methods of burner and mantle makers, who are, as I say, no worse than experts who issue reports made to order. If you buy a pound of cocoa which its vendor says is the finest in the world, you do not buy it again because he says this. You buy it again because it suits you—if you find it better than others. So it is with a burner. You test it yourself; and if you find it better than others, you try and induce your consumers to use it. A standard method does not help you. Your standard method is, or should be, that way which gives you the best result; and it is a very certain thing that the same method of use cannot universally yield the best result, and therefore is, as I set out to show, not desirable.

(2) I now pass to the consideration of the second proposition—that the prescription of a standard set of conditions for testing is not possible. Consider for a moment the factors which enter into the determination of the illuminating power of an incandescent burner and mantle: (*a*) The burner construction. (*b*) The air supply and admixture. (*c*) The quality, composition, and pressure of the gas. (*d*) The maximum incandescing capacity, shape, and life of a mantle. (*e*) The standard of light used. (*f*) The method of making the photometric test and of expressing results. Before we talk of standard methods, we must ask ourselves how many of these essentials are capable of reproduction, and do always exist as common factors in any gas district—assuming always the absence of the personal factor in testing.

(*a*) *The Burner Construction.*—Let everything else be equal, a difference in burner construction will alter the results; and it is obviously impossible to adopt one burner—say, the original "C" Welsbach burner—because it does not suit one gas as it suits another, and its adoption would mean the tale of the "'London' argand burner and the 5 foot rate" over again. Further, suppose we did adopt one burner for comparative purposes, how long are present conditions going to last? How long will it be before we arrive at non-luminous nitrogen-loaded gas of low caloric, which would actually not burn at all in a "C" burner? So it is manifest that, even for comparing mantles, we cannot adopt a standard burner for universal use. Yet, I myself might choose to use always the same type of burner to test different mantles and with perhaps, in a limited way, more or less satisfactory results; but the man who lives in the next (gas) district to me would want something very different.

(*b*) *The Air Supply and Admixture.*—The pantomimic phrase "Here we are again!" expresses my sentiment on this point. We are confronted with just the same difficulties. How can you specify a given proportion of air admixture, when this depends (if we want to obtain Lord Rosebery's blessed word "efficiency") upon the gravity, composition, flame heat, and pressure of the gas, Moreover, under any circumstances the prescription of a definite proportion of air would be obviously only applicable to one type of burner, the universal adoption of which I have shown to be undesirable and impracticable.

(*c*) *The Quality, Composition, and Pressure of the Gas.*—This again is very germane to the question of air supply; and the same remarks apply. What on earth is the practical use of specifying a particular method of procedure when the mere fact of the gas being different in composition (enriched with benzenes as compared to hexane or with carburetted water gas as compared with cannel, or 13 candles quality as compared with 16 candles, for example) renders such standard method inapplicable. What, again, in the use of saying test at 15-10ths pressure, when the gas in one district reaches the consumer at 30-10ths, and in another district at 10-10ths? Is it not obvious that the introduction of a variant in any one of these gas factors upsets any notion of a fair comparison? Again what is the use of saying, for instance, take a "C" burner, and consume $3\frac{1}{4}$ feet per hour? Why, in some cases you would not get more than 10 candles per foot. I have in mind a test when this consumption produced a wretchedly poor result; but when it was increased to 4 feet, the splendid result of 22 candles per foot was obtained again and again. Yet with the same burner and mantle, but a different gas, I could barely burn $3\frac{1}{4}$ cubic feet in order to get the best result possible. So much for the gas.

(*d*) *The Maximum Incandescing Capacity, Shape, and Life of a Mantle.*—In considering this point, it is necessary to deal with two alternative assumptions—firstly, that it is the burner and mantle which are being tested; and, secondly, that it is the mantle only. If the former, it is obvious that, assuming the mantle to be reproducible (and who ever saw two mantles alike?), the question of air supply, quality of gas, &c., would render all attempts at standardization impossible; while if the latter, how can you test one mantle against another when even the same burner on the same gas must be used differently in order to yield the maximum result with two different mantles, and when, in order to complete the mantle test, you must, as pointed out by Mr. Rettich, take the life into consideration? I call this the "*Caudine forks*" aspect of the question; and you can see that the very elementary consideration of each of my preceding propositions comes back to the point that there is nothing in common, and that *the way to test an incandescent burner is to get the best result you can*—the method of use yielding such results being, of course, reproducible.

(*c*) *The Standard of Light Used and the Method of Making a Photometric Test and Expressing Results.* These points can be glanced at for a moment together, because they are questions which can, without active harm, be deliberated upon by a Zurich Congress or Photometrical Commission. But, after all, it matters little what standard of light is used, so long as it is a recognized form and has a recognized factor for conversion. The question of photometer is simpler still; for it is a certain thing that, unless there are photometers of which the text-books make no mention, the "Flicker" system is the only one by which it is at all possible to compare accurately any known standard of light with an incandescent gas-burner. I am sorry it falls to me to make this observation, because it might appear to savour of advertisement; but it is, I am sure, a correct and sound statement to make. I suspect, indeed, that the use of other devices which cannot be read properly, has genuinely deceived experimentalists into making statements of results which are obviously wide of the mark. (The Holgate tests, for instance.) As to expression of results, for comparisons of similar types of single burners or mantles, no doubt horizontal tests will serve; but for comparisons of the effective duty of different sources of light, the "spherical intensity" involving angle tests is the only satisfactory and fair form of expression.

One word in conclusion and in summary. A gas manager's obvious course from motives of self-interest (to put it no higher) is to give his consumers the best light for the lowest cost, and to facilitate the adoption of his recommendations. It is also to the interest of every burner and mantle manufacturer to see that the burners and mantles he supplies to a particular district are suited best to the conditions prevailing there, and not, as is now the case, to sell only a standard pattern and type. It is a simple matter for a gas manager, after having found precisely the best burners and conditions of using them with the gas he sends out, (*a*) to issue them to his consumers in the form found best, (*b*) to supply gas of one standard composition, (*c*) to supply all his consumers at one standard pressure, and (*d*) to encourage maintenance by his officials. The question of maintenance is of the utmost importance, because, if we believe Carlyle, people are mostly fools, and because nothing deteriorates so rapidly through neglect as an incandescent burner, while nothing can be revivified with less exertion; so that it is plainly self-interest to see that consumers are getting the best results they can.

The Zurich Congress, or any other competent body, can, it seems to me, with public advantage frame a set of rules confined strictly to photometric procedure; but further than this I think any attempt at prescribing a standard set of conditions must end in failure; for it would be absurd. *Q. E. D.*

## NAPHTHALENE REMOVAL.

By Mr. WILLIAM YOUNG.

As explained in my former communication on the above subject, my main object in referring to the Young and Glover patent was to show that the specification described a naphthalene removal process by the use of a supplementary supply of hydrocarbon solvent liquids that was identical with, and anticipated, that claimed by Mr. J. Ferguson Bell and others, and that, unless they could point to such a process as having existed prior to the publication of the Young and Glover specification, my colleagues and myself were certainly entitled to the credit of solving the naphthalene problem, or at least of anticipating what was being done by them.

Your kind and highly appreciated editorial comments upon my communication presented the matter in a much broader aspect; and no doubt these comments explain why Mr. J. Ferguson Bell, instead of referring to a concrete process anticipating that described in the specification, makes a series of statements reflecting upon the legal validity and scientific novelty of the Young and Glover patent, giving a large number of references to prior knowledge of chemical and physical facts relating to the subject which, by the application of inventive skill, could be utilized in building up such a process. Mr. Bell, however, fails to refer to any instance when that inventive skill had been previously applied to the evolution of such a process as that described in the Young and Glover specification. The only concrete process to which he refers is that of the well-known Maxim carburettor, for carburetting gas in bulk with light petroleum naphtha or carburine; and Mr. Bell refers to this process as being equivalent to, and an anticipation of, the Young and Glover process of volatilizing into naphthalene-charged gas the vapours of hydrocarbon solvents having similar vapour tensions to that of naphthalene. Mr. Bell could not have referred to a process better illustrating what constitutes the novel features of the Young and Glover process.

Prior to the date of the Young and Glover patent, it was admittedly well known that naphthalene present in coal gas was due to the high heats employed in carbonizing the coal. It was also well known that naphthalene was soluble in, and was dissolved out of, the gas by the liquid hydrocarbons present in coal tar; and it was further known that heavy tar oils absorbed and removed all the vapours diffused through coal gas. These two well-known properties of the hydrocarbons had been recognized and applied in the process of condensation, and the solvent power of the tars for naphthalene used to dissolve that substance. But from the nature of the process, the naphthalene could not be very well absorbed without simultaneously absorbing a portion of the illuminants. It was also well known that, by distilling the vapours of liquid hydrocarbons into mains and services partially blocked with naphthalene, the vapours condensing upon the surface dissolved the naphthalene and removed the obstruction.

It had also been believed, and accepted as a fact, that the vapour of liquid hydrocarbons such as light petroleum, naphtha, carburine, benzol, &c., which dissolved naphthalene in the liquid state, had also a solvent power, when diffused through coal gas in the shape of vapour, of preventing the naphthalene vapours that might be present in the gas from being deposited as crystals. The extended use of carburetting hydrocarbon fluids, and the nevertheless continued trouble from naphthalene, had, however, begun to cause doubts upon these points, and, as explained, the introduction of the use of the Peebles process for a like purpose drew special attention to that doubt, and led to the devising of the Young and Glover process. The specification of the patent for this process explains how that prior knowledge could be applied to do what had never been done before—how a supplementary supply of hydrocarbon liquids could be successfully employed to selectively wash the naphthalene out of coal gas without at the same time washing out other valuable illuminating hydrocarbon vapours, or alternatively carburetting or diffusing through the naphthalene charged gas the vapours of hydrocarbon liquid solvents that would selectively condense out of the gas along with the naphthalene and prevent it being deposited as a crystalline solid, or how to do both of these functions at the same time.

I am much surprised that Mr. Bell should refer to the Maxim carburettor process as an anticipation of the Young and Glover process of diffusing through the naphthalene charged gas the vapours of hydrocarbons having a similar vapour tension to that of naphthalene, as no one knows better than he does that the volatile hydrocarbon fluids used to carburet the gas in bulk by the Maxim process did not have, nor were intended to have, a vapour tension similar to that of naphthalene. He also knows—for he is using them at Derby—that the hydrocarbons having a similar vapour tension to that of naphthalene could not possibly be used, owing to their high boiling, in a Maxim apparatus. The light petroleum naphtha, or carburine, used in the Maxim process had a vapour tension many times greater than that of naphthalene, and was never intended to condense out of the gas and act as a solvent for the naphthalene, but was intended to remain in gaseous diffusion; and no one knows better now than Mr. Bell that, so long as the carburetting liquid (however good a solvent for naphthalene) remains in the gas in a state of vapour, it has very little effect in preventing the naphthalene which may be present in the gas from being deposited as a crystalline solid. Further, Mr. Bell must have seen that the use of such fluids is distinctly disclaimed in the Young and Glover specification.

Mr. Bell, in describing the evolution of the Derby process—which he claims as a new and pioneer system developed upon the results of his own investigations—says:

> In our case—and the same applies to many other towns—the washing of the entire make of gas with heavy oils, such as creosote and tar oils obtained from blast-furnace gases, and, later, with petroleum, extending over many months, proved to have no remedial effects upon naphthalene stoppages, as the complaints still continued as numerous as ever. It was not until we discovered the gas was being denuded of its illuminants, but also of its naphthalene solvents, by washing it with these heavy oils, that we began to perceive we were undoing on the one hand what good we were effecting on the other.

Now I have first to draw attention to the intentional unfairness of Mr. Bell in thus inferentially reflecting upon the process claimed by Young and Glover by making such statements as the foregoing, and that in a former letter, to the effect that:

> Notwithstanding the wide claims made in the Young and Glover patents, they have strongly advocated the use of heavy tar oils obtained from blast-furnace gases, and later amalgamated their process, I believe, with that of Mr. Leather, so as to include creosote to wash out the naphthalene present in crude gas. But, unfortunately, these heavy liquid hydrocarbons also take out valuable illuminants and light oils, which are so effective as naphthalene solvents; and it has been found that this has militated so much against the successful working of the Young and Glover or Leather process that it has had to be abandoned.

Mr. Bell is entirely wrong with regard to amalgamation; and he is equally in error in other respects. Surely he will admit that heavy tar oils free from naphthalene, such as he refers to, will, if employed in suitable washing arrangements, remove the naphthalene out of the gas; and if the naphthalene was so removed, it could not possibly be the naphthalene leaving the works that was the cause of the continued complaints to which Mr. Bell refers, but must have been due to the naphthalene previously sent out and lodging in gasholder mains and services. If Mr. Bell had consulted the Young and Glover specification, he would have found it fully explained that, if he wanted to prevent the heavy tar oils from denuding the gas of its illuminants and naphthalene solvents, he would require to add these to the heavy oils before employing them to wash the gas. Why did he not do so? If the Young and Glover process failed, as he says it did, was it the fault of the directions given in the Young and Glover specification as to how their process should be carried into effect, or the neglect of Mr. Bell and others of these directions, which led to the asserted failures?

Mr. Bell's narrative as to the evolution of the Derby process may be all perfectly true; but in my former communication I drew special detailed attention to the practical identity between the process claimed to have been developed upon the results of his own investigations, and that described in the Young and Glover specification. That illustration of the Young and Glover process did not employ any of the heavy tar oils to which Mr. Bell refers, but solvents practically identical with those used by him at Derby, consisting of the early parts of the distillate of coal tar; the only difference being that, instead of the benzol, and other more volatile illuminants being removed, they were left and not separated by fractional distillation as is the case with the solvents used at Derby.

Instead of referring to irrelevant and distorted illustrations of the application of the Young and Glover process, one would have expected Mr. Bell to have taken note of the particular illustration of the process to which his special attention had been directed as that which anticipated the process which he claims to have developed at Derby. The only explanation is that Mr. Bell could not do so without being driven to the admission that the process fully explained and described in the Young and Glover specification was substantially identical with, and anticipated, his at Derby—that in both cases the hydrocarbon liquids performed the same functions in acting upon the naphthalene in the gas. He would even have had to admit that in the case of illustration of the use of the process given in the patent specification, these functions would be better performed, as the washing fluid, owing to the presence of the benzol and other volatile illuminants, would not denude the gas of them as would be the case at Derby.

## THE CONSTRUCTION AND USE OF STEEL HOPPER RAILWAY WAGGONS.

Considering the importance of the design and employment of coal-hopper railway trucks, especially in respect of their use for gas-works, it is rather surprising that the literature and information on the subject should be somewhat meagre. The force of this complaint has been to some extent reduced by the large amount of matter dealing generally with the question contained in the last-issued volume (CLVII.) of the proceedings of the Institution of Civil Engineers. In this are to be found three papers by three different authors,* all bearing more or less directly on the subject, and, with the discussions and full illustrations, forming a fairly complete *résumé* of modern practice in this respect.

Low first cost and easy and cheap repair were, and are, strong points to be overcome. At the same time, the acknowledged advantages of steel over timber are not to be overlooked. The ultimate tensile strength of the former may be roughly taken as about ten times that of the latter; Mr. A. L. Shackleford giving the figures of 6720 lbs. per square inch for oak and teak, and 62,720 lbs. for steel. Again, an oak scantling, 12 in. by 5 in. weighs 22 lbs. per lineal foot, and has a sectional area of 60 square inches, whereas a corresponding steel beam 9 in. by 3 in. by $\frac{3}{8}$ in. weighs 19 lbs. to the foot, and its area in section is only 5·75 square inches. It is perhaps in the fact that the only practicable cross section for timber is rectangular lies its inferiority compared with steel joists. Where it becomes a question of carrying as heavy a load with as light a tare as possible, then the advantages of waggons of high capacity, necessarily constructed of steel, become more apparent. Thus the tare of an ordinary four-wheeled coal-waggon is about 62 per cent. of the load carried; but by the adoption of large steel trucks, this proportion can be reduced to little more, and sometimes to less, than half.

But notwithstanding the fact that about 70 per cent. of the goods traffic is for coal or other minerals, it would be false to argue therefrom that steel waggons of high capacity are the most suitable for general purposes, and should therefore supersede entirely the older and smaller trucks. Who has not heard men taking the false analogy of North or South American practice in this particular—as well as in others—and showing clearly to their own satisfaction that our home railway authorities are much behind the times? Such persons forget in this instance, as in others, the different geographical and trade conditions between (say) the United States, with its immense distances, and the United Kingdom with its limited lengths. In the former country, consignments of grain or mineral are very large, and have to be taken direct many hundreds of miles for shipment. Just the reverse is the case in England. This was well brought out by Mr. Oliver Bury, the General Manager of the Great Northern Railway, who came from the greatest South American Railway with a prejudice in favour of large waggons. "On an ordinary day in one of the London coal-depots, 83 small waggons of coal had been received, of which 32 had been single trucks from different collieries, 11 consignments of 2 trucks, 4 of 3 trucks, 3 of 4 trucks, and only one consignment requiring 5 trucks. For only 8 consignments, therefore, out of a total of 51, would it have been possible to use 30-ton waggons." So also on the London and North Western Railway 80 per cent. of the coal is carried in consignments of less than 20 tons. Such figures clearly show, apart from the important accessory points of existing low screens and small turntables, &c., that waggons of large capacity are impracticable, and certainly not of universal adoption.

But what about self-discharging or hopper coal waggons? Surely these, of whatever capacity, could be used in increased numbers and with greater economical effect than is at present the case. Their adoption has hardly kept pace with that of modern mechanical means of dealing with coal and coke in gas-works. In many instances, one can yet see men laboriously shovelling coal by hand from trucks into underground hoppers, breakers, and elevator buckets. The inconsistency is too apparent. If suitable hopper waggons could not be procured, at least some tipping device should be adopted. A case is quoted by Mr. Twinberrow of the supply, for a certain works, of 170,000 tons of material for concrete. As delivered by hopper waggons, the cost on the site amounted to about $\frac{1}{2}$d. per ton. There being an insufficient supply of these self-discharging waggons, some portion of the material had to be sent in, and unloaded from, flat-floor trucks, which brought the charge for labour to 2d. per ton. This signified a reduction of £1000 in the net profit of the undertaking.

The testimony of Mr. Henry Hack was even more significant; he having had in use for the last eight years at the Birmingham Gas-Works several 10-ton steel hopper waggons, as designed by Mr. Charles Hunt and Mr. Shackleford. There were now 300 of such waggons in service. "The cost of discharging was *nil*, as the opening and closing of the doors was done by the engine-attendant; whereas at works where there were no such hopper-waggons, the coal being received in wooden waggons with side doors, the cost of discharging on to the coal-breakers was 2$\frac{3}{8}$d. per ton. This saving, applied to the whole of the coal discharged into hoppers annually, would mean a total saving of £4500; but the ordering of more of the 10-ton steel hopper-waggons had been deferred in the hope that it would be possible to run 20-ton or 30-ton waggons." But the conditions required both by the Midland Railway Company and the Birmingham Gas-Works are rather stringent and somewhat exceptional. The regulation waggon of the former for a 30-ton load was to be 10 feet high and 35 feet long over all. But the height was just the difficulty as far as Birmingham was concerned, for the gas-works' gates and doors necessitated having trucks 9 feet or less in height.

This condition was, of course, fulfilled by the 10-ton hopper waggons in use, of which a few particulars may be given. The body of it is 16 ft. long by 7 ft. 2$\frac{1}{2}$ in. wide inside, carried on four wheels, 3 ft. 1 in. diameter, provided with double hand-lever brakes. The two pairs of wheels are at 9 feet centres and the journals are 8 in. by 3$\frac{3}{4}$ in. The height of the waggon is only 8 ft. 10 in. from the rail, the depth of the body being 5 ft. 0$\frac{3}{8}$ in., and from the rail to the centres of the buffers, 3 ft. 5 in. The underframe is made up of channels, angles, and plates, all in steel and riveted together. There are two side doors in case of need, each 4 ft. 1$\frac{3}{4}$ in. by 2 ft. 9 in., fitted with the usual hinges and fastenings. The two hopper or bottom sliding doors are 2 ft. 6 in. by 2 ft. 4 in., and are controlled by handles and shafts geared with steel pinions and racks, workable from either side of the waggon. The weight per axle on the rails is 8 tons 6 cwt.; the tare being 6 tons 12 cwt., or 14,784 lbs. The capacity of the waggon is 420 cubic feet., which, of course, gives the 10-ton load at 42 cubic feet to the ton. Lastly, the ratio of the load to the weight of waggon as loaded on the rails is 60·24 per cent.

There are now obtainable several different types of self-discharging waggons from the 10-ton example just described up to 40 and even 70 ton loads—some having four wheels, others with bogies; some with horizontal sliding doors, others with hopper or inclined doors. A very useful form of automatic waggon is one for 20 tons, the dimensions of which come within the regulations of the Railway Clearing House. Its wheel base is 10 feet, or only 1 foot more than the Birmingham waggon. Its length is 18 feet (or 2 feet more), its width 8 feet (or less than 1 foot more), and its height is 10 feet (or 1 ft. 2 in. more). Thus it is eminently suitable for all ordinary conditions, sidings, doorways, and turntables, and its tare is lower than that of any flat-bottomed 20-ton waggon in use. The hopper doors are conveniently placed close to the rails, which thus reduces breakage; the principal end portions of the load being discharged at an angle of 36°, the intervening centre part being at 45°. If a heavier load is required to be carried—say, 40 tons—a similar waggon to the preceding one, but running on bogies, can be adopted. It is 35 feet long, or 38 feet over the buffers. In width, it is 7 ft. 5$\frac{1}{2}$ in., and its height is the usual 10 feet. In other respects it also conforms to the railway regulations. It is arranged to discharge its load low down to, and in between, the rails; and it has the advantage, by the arrangement of its discharging doors, of enabling the coal to be unloaded very regularly both in the centre and at each end of the waggon.

The few automatic waggons to which attention has here been called form but a small number of the variety existing; and we think it may reasonably be hoped that attention on the part of gas engineers and managers to the important item of receiving and discharging their coal in the most economical way possible will very likely prove satisfactory to themselves and profitable to the undertakings in their charge.

* (1) "The Construction of Railway Waggons in Steel." By Mr. J. D. Twinberrow. (2) "The Construction of Iron and Steel Railway-Waggons." By Mr. A. L. Shackleford. (3) "Iron and Steel Railway-Waggons of High Capacity." By Mr. J. T. Jepson.

# AMERICAN GASLIGHT ASSOCIATION.

### Annual Meeting at Washington.

The Thirty-second Annual Meeting of the American Association was held in Willard's Hotel, Washington, on the 19th and 20th ult., under the presidency of Mr. Rollin Norris, of Philadelphia. According to the last number of the "American Gaslight Journal" to hand, there was a good attendance of members, the business proceedings were interesting, and perfect weather allowed of the social functions being enjoyed to the full.

The meeting was opened at 10.15 a.m. on the first-named day by the President, who introduced Captain J. Johnson Morrow, the Acting Engineer to the Commissioners of the District of Columbia, who in suitable terms welcomed the Association to Washington. The formal business was next proceeded with. It included the addition of 91 names to the roll—consisting of 44 active members, 25 associates, and 22 juniors. The new members having been introduced, the Secretary and Treasurer (Mr. A. E. Forstall, of New York City) read the report of the Council. In the course of it, they recommended that the salary of this officer should be increased to $750 per annum, and that he should be allowed $250 for the hire of a clerk. The report was adopted, as were also those of the Secretary and Treasurer. The members learned from it how large had been the number of removals by death, no less than sixteen members—among them being Mr. A. B. Slater, General Hickenlooper, Captain White, Mr. T. Littlehales, Mr. Oscar B. Weber, and Mr. W. A. Stedman—having passed away, five of whom had served the Association as Presidents. Next came the report of the Trustees of the Education Fund, which disclosed a satisfactory state of affairs. This was followed by a report from the Committee on Research.

These matters having been disposed of, the President read his Inaugural Address. He began by referring to the labours of the members who had been called away, and said the record of the work they did for the profession should be an encouragement and a spur to those remaining to do their best, and leave behind them a record which would help their successors. He then proceeded, as will be seen from the text of the address, which appears in another column, to discuss the subject of the concentration of business interests. The address having been referred, as usual with the Association, to a Committee, the election of office-bearers for the ensuing year took place, with the following result:—

*President.*—Mr. E. G. Cowdery, of St. Louis.
*First Vice-President.*—Mr. C. F. Prichard, of Lynn.
*Second Vice-President.*—Mr. C. R. Faben, of Toledo.
*Third Vice-President.*—Mr. A. E. Forstall, of New York.
*Secretary and Treasurer.*—Mr. G. G. Ramsdell, of New York.

The consideration of a short topic on an experience with reinforcing a low-pressure street-main system by high-pressure mains, brought the morning sitting to a close.

In the afternoon, the first paper was by Mr. E. H. Earnshaw, of Philadelphia; the subject being "Oxide Purification." It evoked an excellent discussion, at the close of which the author was accorded a hearty vote of thanks. Mr. A. G. Glasgow (who we are pleased to find has recovered from his serious illness) having presented the report of the Committee on the President's address, the reading of papers was resumed. One on the "Generation of Steam by Waste Heat from Water-Gas Sets," by Messrs. D. M'Donald, of Louisville, and A. B. Macbeth, of Kansas City, gave rise to an excellent discussion, with which the first day's proceedings ended.

The members re-assembled next morning shortly after ten o'clock, and proceeded to discuss a long paper on "Consumers' Meters," by Mr. B. H. Spangenberg, of Philadelphia. This was interrupted by the selection of Milwaukee as the place for the meeting next year; and just before the midday adjournment, Dr. A. C. Humphreys, Principal of the Stevens Institute of Technology, presented a silver service to Mr. Forstall, in the name of friends in the Association. Mr. Forstall, it may have been noticed, has relinquished the position of Secretary and Treasurer, which he has held for some years.

At the afternoon sitting, the first business was the finishing of the discussion on Mr. Spangenberg's paper. The sum of $200 was appropriated for the expenses of the Committee charged with the task of attempting to secure what the President called "team work" from all the Associations. Next came a paper by Mr. F. W. Frueauff, of Denver, on "Methods of Charging for Gas," which brought out a very interesting discussion. A paper by Mr. W. A. Baehr, of St. Louis, on "Distributing Power Throughout a Gas-Works by Means of Electricity Generated at a Central Point," and one by Mr. W. B. Calkins, also of St. Louis, on "A Rapid Method for the Determination of the Total Sulphur in Gas," were taken as read, and there was a short discussion on each. This practically brought the business to an end.

The social functions included a banquet, over which Mr. Walton Clark presided, and which was attended by 225 guests, and a boat trip on the last day of the gathering. The Entertainment Committee took charge of the ladies, about 120 of whom were present, and conducted them to the principal places of interest in and near Washington.

# MR. ROLLIN NORRIS ON UNITED MANAGEMENT.

### [Inaugural Address at the Annual Meeting of the American Gaslight Association.]

In choosing a subject for discussion in my address, it has seemed to me that instead of attempting a somewhat unsatisfactory review of the progress of the gas business for the past twelve months, it will perhaps be better to talk about a subject which is very close to me, even though it may not appeal to all of you as a matter of direct personal application. It will, therefore, perhaps not be inappropriate for me to ask you to listen to a few words on the general subject of united management, as viewed by one whose professional life has been principally under such a system, and along lines which have brought him into direct personal contact with both the home office and the local operating men. The soundness of any system can be superficially judged by the extent to which it conforms to the general laws of economic progress, and no system can prosper long that does not thus conform.

The marked tendency of development in all lines of technical and commercial activity during the past twenty years has been along lines of specialization and associated effort. The result of this movement is seen in the organization of vast corporations to direct and control the various branches of manufacture, transportation, and distribution. The most economical method of doing work requires usually the expenditure of large sums of money for the most efficient machinery and the most able management. Consequently, a man who has saved a little money, and who wants to invest it in a productive business, can usually do best by associating himself with a lot of other men similarly situated, and so getting the advantages of doing things on a large scale and with the most efficient equipment. Hence the corporation and its rapid spread into all fields where large capital is a requisite of low cost of production.

A similar economic law, working on a larger scale, tends to produce in turn aggregations of various corporations, with the attendant increase in power and effectiveness; and this tendency shows itself in trusts, pools, combinations of various kinds, and in the so-called "community of interests." So the formation of "parent companies," controlling from a central office a number of gas companies, would seem to be in harmony with the general trend of sound economic development, and to that extent at least would seem to be justified.

But let us consider in more detail some of the advantages of this form of management. In discussing this subject, I disclaim all allusion to the success or failure of any existing companies to so handle their business as to have realized all the possible advantages of the system, or to have avoided its disadvantages; and I shall endeavour to treat the subject in a somewhat abstract manner. The advantages of united management as they appear to me are as follows.

(1) *Uniformity of Records.*—The system allows the use of a uniform system of records, which will tell exactly what each company is getting in each department and allow the intelligent comparison of methods.

(2) *General Adoption of Individual Improvements.*—Where any one member of the combination effects an improvement in methods or results, the other members can promptly get the benefit of it.

(3) *Availability of Consulting Specialists.*—No one man can be a specialist in all branches of his business; and a single company, except in the case of the largest cities, cannot afford to have on its pay-roll a lot of high-class men, each of whom is experienced and specialized in his own line of work. But a large number of associated companies can afford to maintain a central office thus equipped with a corps of trained experts, who will be available for consultation with the local managements when needed. And these consulting men, from studying their particular problems for a large number of different companies, have the opportunity of accumulating more experience in their speciality than they would if associated with a single company; and this should result in a higher technical and commercial efficiency all along the line.

(4) *Protection.*—Raiding and blackmail in various forms are possibilities for most public service corporations; and a company that has available the information and resources that come with associated management is in a much stronger position than the isolated company, and better able not only to prevent such attacks, but also to carry on the fight if it cannot be avoided.

(5) *Research Work.*—Here again associated companies should have the advantage over the isolated corporations. A sympathetic and progressive central management should be able to encourage and stimulate effort along sound lines, and discourage the waste of time and money in "rainbow chasing;" while at the same time they can post the local managers as to what progress has been made elsewhere in solving similar problems, and save the waste of parallel effort, either successful or otherwise.

(6) *Economy in Purchase of Supplies.*—A central purchasing department, working in close touch with the local managers, should be able to purchase supplies at a lower average price than the individual purchaser. Not only is there the advantage that comes from the larger quantities to be bought by a central purchasing agent, but his scattered affiliations enable him to keep closer track of changes in trade conditions than can a man who purchases for only one comparatively small concern. Moreover

the purchase of material and supplies in large amounts, based on one set of specifications, makes it much easier for the manufacturer to afford to make changes in his product, which, even though improvements, he perhaps could not afford to do for a small order. This, of course, is an advantage which belongs to united management on account of the larger quantities of material to be bought, and is not inherent in the system itself.

(7) *Enthusiasm.*—There are few men who do not do their best work when fired by a spirit of enthusiastic interest in what they are doing; and when a number of men are working side by side for some common end, this association of itself promotes a spirit of interest and optimism that is wanting in the life of a man who, except for an occasional attendance at a gas convention, rarely meets anyone who knows anything about the gas business or cares anything about it. The rousing and fostering of this spirit of enthusiasm is not a necessary accompaniment of united management, but is a valuable possibility; and its existence or otherwise depends very largely upon the wisdom shown in selecting the men of the central office who visit and correspond with the local managers. These visiting men must have ability and experience enough to command the respect and confidence of the local men, and tact enough to demonstrate that they are there to help the local men to better results, and are not there to pick flaws in a spirit of carping criticism. This brings up the point that, in consolidated gas management, as in consolidated management of all kinds, success is not to be looked for simply because of the consolidation of a number of properties under one general head. The failure to realize this is the fatal mistake that has caused many consolidations to come to grief, and caused many men to conclude superficially that the system of consolidated management is fundamentally weak. The real secret of success lies in the requirement that the general management must *know the business*. Without this knowledge, the larger the combination the more certain is it to fail in its purpose.

(8) *Cheaper Local Managers.*—One of the advantages sometimes urged for united management is that it enables the companies to be run by cheaper local managers, as the problems calling for high-priced talent to solve them can be referred to the central office. While this may and may not be so to a certain extent, I believe that a central management will fall far short of its possible success that assumes that any sort of organization will make it pay to have cheap local representatives. The aim of a central management should not be to use cheaper men and get as good results as isolated companies, but to use the same or better men and get much better results.

(9) Another advantage that accompanies the system of united management, though it is not of itself dependent upon the system, is the opportunity to train and develop men; the opportunity to shift men from smaller to larger responsibility as the men develop, and to place them where they can both work to advantage and at the same time grow. This is an opportunity that the single company has only to a limited degree. If the more important and best-paid positions in the combination are to be filled by promotion from below, it is the part of wisdom to provide the raw material for such promotion; and if there is always to be a supply of men ready for promotion when the chance arises, it will almost necessarily follow that the supply will frequently exceed the demand. This surplus of carefully trained men should be available to fill positions that offer outside the combination. The consolidated companies have the opportunity of judging of the men they train, and they should make it to the advantage of the best of them to stay in the field. But the training of more men than are needed should be regarded as a necessary and desirable form of properly organized united management.

Now for the disadvantages of united management. The advantages are apparent, and with one exception, to which I shall allude presently, the principal arguments urged against united management are based on the difficulty of so organizing and operating as to obtain the possible advantages I have just mentioned. Where the consolidation embraces a number of big properties, the business becomes a very large one, and it is hard to get men at any price who are able enough and broad enough to handle problems on so large a scale But they can be got. It is also hard to get just the right men for the travelling jobs. But they can be got or made. It is perhaps hard to draw the line between discouraging the local men from what I call "rainbow chasing," and discouraging initiative of all kinds.

There is one phase of the system, however, which has been advanced as a weakness, which cannot be so briefly met; and this is the charge that the system of united management tends to retard or prevent the full development of the individuality of the local managers. This is a serious charge; and, if true to any marked extent, it would neutralize many of the advantages of the system. For a system to be sound must be self-supporting—that is, it must develop from its own ranks the material for promotion; and if men outside the system develop into stronger men than those inside, the consolidation is met with a dilemma. Either it must be content with filling the most important and best-paid positions with men who are not so strong as men in the outside companies, or it must go outside its own ranks for its best-paid men. The first course would be manifestly unwise, and the second would be suicidal, as it would detach from its minor ranks all men of ability and ambition, who would realize that avenues to promotion were closed, and seek other positions.

But is it true that the system of united management tends to prevent the development of its local representatives? As the result of a good deal of careful thought and close observation, I believe that the question cannot be properly answered by a categorical "yes" or "no." Responsibility undoubtedly develops a man, and the system of united management provides for someone with whom the local men can confer when in difficulty, and to that extent reduces the otherwise undivided responsibility of the local man. And there are some men who are weak enough or mentally lazy enough to shrink from responsibility whenever they can. With such men I have seen a marked tendency to throw all decisions on the home office where possible; and such men undoubtedly develop more slowly and to a less extent than they would do if they were thrown entirely on their own resources. Men of this stamp, both for their own sakes and for the interest of the company, should not be retained under a system of united management. But where the local man is one of ambition and real strength, the opportunity for consultation with experts, which for the weakling is a source of deterioration, is for him an opportunity for broadening his knowledge—an opportunity of which I have found him very ready to avail himself.

For the man of rather neutral stamp, rapid and thorough development will depend upon the wisdom of the methods followed by the central office in organizing and handling the work. If the central office falls into the error of assuming all responsibility for the various petty details of local management, and, by implication or direct instruction, conveying the idea to the local man that he is merely to carry out ideas which will be supplied to him from the central office, the effect on the local man must necessarily be stifling to his full development and power of initiative. If, on the other hand, the central office in its intercourse with the local man takes the tone that he is running the business, and is expected to do his own thinking, and that the central office's function is to advise and decide doubtful problems, the results in the broadening of the local man's methods and habits of thought are most gratifying.

And here I would again allude to the fallacy of thinking that under a system of united management the work can be carried on by a cheaper and less able grade of man than is required for isolated companies of the same size. To get the best results out of united management, the local men must be able not only to originate ideas and carry them out, but they must be able to absorb the ideas of others, assimilate them, and put them into successful practice.

To sum up the preceding, it may be said that united management is a development of the same underlying philosophic principle that has in the past couple of decades shown itself in the growth of team work in athletics. Each man in a properly selected and balanced team gets more individual development than if every man worked according to his own ideas, and the effectiveness of the combination is increased immeasurably.

The discussion of the advantages and disadvantages of united management leads naturally to the consideration of another form of united effort in the work of Gas Associations. The recent enthusiastic action taken at the Gas Congress in St. Louis, in connection with the address of President Shelton, of the Western Gas Association, and a paper by Mr. H. L. Doherty, read before the congress, shows the existence of a general feeling that our Gas Associations are not getting the results they should, on account of the absence of good team work. This desire for progress, coupled with the instinctive feeling of the line along which progress will naturally develop, is, I think, an encouraging sign in our Association work; and the effectiveness of such work will, I believe, increase in proportion to the extent to which our Associations learn to work in one body. I do not mean that the final form of Gas Associations will necessarily be a single National Association with local branches, nor do I wish to forestall the recommendations which will in due time be made by the Committee appointed to consider this subject; but I believe that, even if there be no organic connection between the various Associations, their work will undoubtedly be best performed when each forms part of an intelligently designed team, and each member of the team does the work for which its location and opportunity best fit it.

I am a very strong believer in the usefulness of State and minor Associations, and heartily believe that any modification of Gas Association organization which would reduce the interest and activity of these minor bodies would be a serious injury to the profession. But it seems self-evident that the best total result will be obtained when the Associations work as a team, and the State Associations do not attempt to do the work which a National Association—or National Associations, if the country is too large for one—can best do, and when the larger Associations do not fritter their time away in trying to do the work which can better be done by minor Associations.

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**Belgian Association of Gas Managers.**—In the "JOURNAL" some weeks ago, we noticed Part I. of the "Transactions" of this Association for the year 1903-4. It consisted entirely of a communication by M. Boscheron on the subject of the use of gas coke for heating purposes. We have now received Part II., which contains, besides a report of the general business, the list of members, &c., an exhaustive paper by Dr. D. de Paepe, one of the Professors at the new University of Brussels, on the Weber photometer, and a shorter one by M. Greyson de Schodt on the advantages and the future of the Plaissetty mantle.

# SCOTTISH JUNIOR GAS ASSOCIATION.

### Western District.

About eighty members of the Western District of the Scottish Junior Gas Association assembled in the Technical College in Bath Street, Glasgow, on Saturday evening, under the presidency of Mr. JAMES LOWE.

The PRESIDENT, in opening the proceedings, said the Vice-President—Mr. J. Barker, of Greenock—had been appointed as Manager of the Nairn Gas Company; and while they were sorry to lose him as Vice-President, they were all pleased that he had obtained promotion. The Council had had under consideration the appointment of his successor; and he had pleasure in informing them that Mr. James Bell, of Airdrie, had been appointed. The Council had power to fill up any vacancies which might occur. Their next meeting would be a visit to the Kilmarnock Gas-Works. The Council thought it would be advisable if members who took part in discussions would send their remarks, in writing, to the Secretary, after the meeting, so that they might keep a record of their proceedings, possibly with a view to publishing them in book form, if it should be thought desirable to do so.

Mr. C. M'FARLANE (Tradeston) then read the following paper:—

## PURIFICATION.

Gentlemen,—The term purification being very comprehensive in its meaning, it is well that I should explain that it is my intention to deal with the removal from coal gas of the following impurities—viz., sulphuretted hydrogen, carbonic acid, and the sulphur compounds, by means of lime and oxide of iron—and to place before you some results obtained from experimenting with these purifying agents. In the first place, I shall deal with the purification by lime, and give a short description of the method employed at Tradeston, where lime only is used. The advantages to be gained by using lime are that it removes both the sulphuretted hydrogen and carbonic acid, besides reducing the sulphur compounds to a minimum. The limestone is received at the works in quantities of about 200 tons at a time; and it is then burned in kilns. Limestone, on ignition, gives up its carbonic acid and becomes oxide of calcium, or burnt lime. This oxide of calcium is then well watered, during which operation great heat is evolved; the lumps crumbling to powder, and its bulk being nearly doubled. This is known as "slaked lime" or calcium hydrate, and is then ready for use in the purifiers. The great objections to the use of lime are that it is of no value as a bye-product after becoming saturated with impurities, and its odour is occasionally regarded as a nuisance. Then you have the trouble and expense necessary for its removal.

Many and varied are the methods employed in the usage of the lime in the purifiers. There are, for instance, deep and shallow layers—two, and in a few cases only one layer in the purifier is used. I know of a works where one layer of 3 feet in thickness is employed at the present time; but this is Scotch lime, which is inferior to Irish for purification purposes. When one of these purifiers is put out of action, the spent lime has often to be dug out with the aid of picks, it having become almost a solid mass. At the Tradeston works we have two layers of lime in each purifier; the bottom layer being 9 inches thick and the top 8 inches, which we find answers the purpose admirably, and it also enables the spent material to be handled with ease. The greater part of our spent lime is removed to refuse tips, the remainder being taken by farmers for manurial purposes. There is a town in the South of Scotland where the farmers, besides paying for the spent lime, remove it out of the purifiers and cart it away at their own cost. The farmers are wise in that part of the country in knowing what is good for their soil; and the gas company are somewhat fortunate in getting rid of their spent material on such advantageous terms.

The spent lime, like the ammoniacal liquor, is of a complicated character; a partial analysis gave—

| | | |
|---|---|---|
| Sulphur | 3·76 | per cent. |
| Cyanogen | 0·123 | ,, |
| Carbonic acid | 27·32 | ,, |
| CaO | 36·42 | ,, |
| Free $NH_3$ | 0·13 | ,, |

The cyanogen existed as sulphocyanide of calcium and as prussian blue.

### OXIDE OF IRON.

As you are aware, oxide of iron removes only the sulphuretted hydrogen. The chief reason why it is used in purification is because of the fact that the bulk of the sulphur in the gas is obtained as a valuable bye-product. When oxide ceases to absorb sulphuretted hydrogen, it is usually removed from the purifier and exposed to the action of the air. The sulphide of iron which has been formed by the action of the sulphuretted hydrogen in the gas is decomposed by the oxygen of the air, with reformation of oxide of iron and separation of free sulphur. This oxide of iron is thus used over and over again until it becomes charged with as much as 70 per cent. of sulphur, when it is used in the manufacture of sulphuric acid; and sometimes the prussian blue which it contains is also extracted. At many works lime is used along with oxide; and the question arises, In what proportion should they be worked? On this point many different opinions are held. If these materials are used in the proportion of two of oxide to one of lime, the purified gas will contain carbonic acid, and the sulphur compounds will be raised. I found while working with equal proportions of lime and oxide that, although the gas contained a trace of carbonic acid, and a slight reduction took place in the illuminating power, the sulphur compounds were much about the same.

There has been some talk lately of doing away with lime in purification. This would mean that the carbonic acid would be left in the gas, and there is a serious objection to this, as I shall endeavour to prove to you. Carbonic acid reduces the illuminating power, and cannel coal or other enriching materials would require to be used to keep the gas up to its standard; and so long as you are supplying gas equal to 20 candles—as we do in Glasgow—the proposed innovation appears to me to be quite impracticable. Sir George Livesey, in a statement laid before the Departmental Committee on London Gas Testing, said: "If they were free from the sulphur clause, they would discard lime altogether, because he did not think that the presence of a small quantity of carbonic acid in the gas affected the illuminating power much." Continuing, he said: "I made some experiments testing gas that had been passed through lime and other gases that had not; and I could find no appreciable difference in the illuminating power."*

Well, I was somewhat surprised by the startling enunciation of so eminent an authority; and in order to satisfy myself, I made a series of experiments and obtained quite different results. First I passed the gas through purifiers containing lime, and tested it for illuminating power and sulphur compounds. The gas was equal to 16·22 candles, and contained 9·66 grains of sulphur per 100 cubic feet. I next used oxide and lime in equal proportions; the gas first coming in contact with the oxide and then with the lime. The illuminating power was 15·31 candles, or a loss of 0·91 candle as compared with the purification by lime only. The sulphur in the gas amounted to 10·72 grains per 100 cubic feet. This method was then reversed; the gas being first treated by the lime and lastly by oxide. The result obtained was practically the same as the last—viz., illuminating power 15·21 candles, and 10·83 grains of sulphur per 100 cubic feet of gas.

My next experiment was to use oxide of iron alone; and the result was that the illuminating power dropped to 11·27 candles, or 4·95 candles less than that obtained from the lime purification, while there were 16·51 grains of sulphur per 100 cubic feet of gas, or an increase of nearly 7 grains. Working with lime and oxide in combination, you will see from these figures that approximately 1 candle was lost as compared with the purification by lime alone. This might not be of much account when the value of the spent oxide as a marketable commodity is taken into consideration; but there is the great difference of 5 candles between the oxide and the lime purification. That loss was due to the presence of carbonic acid in the gas; and surely 5 candles is more than an unappreciable difference.

So far as the sulphur compounds are concerned, the results obtained from the lime and from the lime and oxide in combination vary to a very small extent; but the difference of 6·85 grains of sulphur per 100 cubic feet of gas between the lime and the oxide used separately is considerable. It is desirable that the sulphur compounds should be reduced to as fine a point as possible, and this can only be attainable by using lime. In these days, when the chief endeavour appears to be to make gas cheaper, the purity is apt to be thrust in the background; but I maintain that other things should be taken into consideration besides the question of cost, which is often brought forward as an excuse by those who wish to discard the use of lime in purification. Again, with electric light as a strong rival to gas, it is advisable—while gas of 16-candle power is sufficient for all purposes now that incandescent lighting has proved such a success—that we should still supply a gas of as pure a quality as hitherto.

The PRESIDENT said the paper they had just had from Mr. M'Farlane had been an extremely interesting one. The author had wisely restricted his observations to the removal of sulphuretted hydrogen, carbon dioxide, and other sulphur compounds. The whole subject of the purification of coal gas was too large for treatment in one short paper. While this was so, he was sure that members would be glad to have any remarks in the discussion on the extraction from gas of tar and ammonia or any of the other impurities, especially as this was the only paper they had on their syllabus dealing with the removal of impurities from gas. He would, however, with Mr. M'Farlane's consent, and with that of Mr. Bell's, defer the discussion until Mr. Bell's paper on revivification of oxide had been read, as the two subjects were, in a great measure, related, and each might throw some light on the other.

Mr. J. BELL (Airdrie) then read his paper, which was on

## THE REVIVIFICATION OF OXIDE IN SITU.

In the early days of gas manufacture, lime, in the form of "lime water" or "cream of lime," was used for purifying gas, so as to deprive it of all disagreeable odour during combustion; and about the year 1808 machinery was introduced for the purpose of keeping the mixture of lime and water in a constant state of

* The evidence here referred to was summarized in the "JOURNAL" for July 5, p. 50.

agitation. The refuse material, or "blue billy" as it was called, was not easily disposed of, and gave rise to considerable trouble; and the system gradually disappeared in favour of the dry-lime process, which was introduced by Reuben Phillips, of Exeter, in 1817. We are indebted to John Malam for the perfecting of Phillips's apparatus; and the arrangement of purifiers and centre valve patented by him in 1823, for working purifiers in sets of four with one out of action, is the form employed in most works at the present time.

The use of oxide for purifying gas from sulphuretted hydrogen was experimented with on a large scale at the Chartered Gas Company's works in 1849; and during the experiments the revivification of the material was accidentally discovered, and the first trial of "revivification *in situ*" took place in October of that year. But later in the same year, they found that the gas was passing through the material unpurified; and investigation proved that the inactivity of the oxide was due to the low temperature experienced during the winter season. Oxide of iron is now used, alone or in conjunction with lime, in most of the gas-works in England, and in a few works in Scotland. The spent lime from the dry process contained a greater amount of ammonia in the early days of its use than it does in present-day manufacture, owing to this impurity now being absorbed before it reaches the purifiers; and there is therefore not the same ready market for the spent lime for agricultural purposes as formerly. In many cases the difficulty of disposing of the spent lime is now a serious one; and it was this difficulty that led to the introduction of oxide of iron at Airdrie, for it was found that the space required for revivifying oxide of iron by exposure in the usual way was no greater than the accommodation required for storing spent lime while awaiting the opportunity of disposal.

The purifiers at Airdrie are four in number, and are controlled by a centre-valve (similar to that patented by Malam) working three on and one off. The boxes are 16 feet square, containing three tiers of sieves, each box having an area of 768 square feet of purifying surface—the material being placed about 8 inches deep; making the total purifying area of the three boxes 2304 square feet. The oxide of iron in use is an artificial oxide; being a bye-product obtainable from the manufacturing chemist. As delivered at the gas-works, it is in a dense black powdery form, having the resemblance of soot, and has to be mixed with an equal bulk of sawdust so as to keep the oxide in an open condition, to allow the gas a free passage; water has also to be added till the material attains nearly the same consistency as lime when ready for the purifiers. The first experiment was made by filling each alternate box with lime and oxide; but we gradually discarded the lime altogether in favour of the oxide. At first, we revivified the oxide in the usual way—*i.e.*, by emptying the boxes, and exposing the fouled oxide to the action of the atmosphere.

I may here mention that when turning oxide of iron of this nature out of the boxes for the first time, it is of the utmost importance that the purifiers should be emptied speedily, as this oxide, when exposed to the action of the air, absorbs the oxygen so rapidly that it generates heat sufficient to render the mass red hot. To guard against the difficulties which arise from low temperature, we have introduced steam into the purifiers, and have thermometers fixed on to the covers of each purifier to ascertain the temperature, and to regulate it accordingly. The first experimental apparatus used at Airdrie for introducing the air supply took the form of a sealed vessel, placed at the inlet of the exhauster; the gas being under vacuum at this point, the air was sucked or drawn through. We had no means then for measuring the supply of air; the sealed vessel being placed there to prevent the escape of gas, should there be any falling off in the exhausting. Owing to the variations of exhaust at the point of suction, this method of admitting air proved unsatisfactory.

It was next resolved to try the same experiments at the inlet of the condensers—this time to connect a meter so that we could register the amount of air passed through. But the vacuum at the inlet of the condensers being insufficient to draw in air through the meter, we introduced a steam-jet between the meter and the inlet of the condensers; and this gave the desired results, acting on the same principle as the steam-jet exhauster. We found by this improvement that we could draw in through the meter with regularity as much air as was necessary for our requirements. The introduction of a limited quantity of air by this apparatus, in the manner described, while working the purifiers in the usual way, only assisted in prolonging the period between the changes; and the process of changing continued in the same rotation as before the introduction of the air experiments.

To do away with the necessity of emptying the idle box, for subjecting the material to the action of air, we fitted up another apparatus for blowing air into the inlet of the idle purifier; this blower being in the form of a steam-jet, blowing into a pipe of 1½ inches internal diameter, and connected with branch pipes led into the inlet of each purifier. Each branch is supplied with a valve, and only one valve to be opened at a time, and that being on the inlet of the idle purifier, it is necessary to draw the plugs of the purifier covers so that the air can pass freely through the purifying material and escape at the plug-hole.

Our manner of working the purifiers up to this point had been the usual way—*i.e.*, whenever a trace of sulphuretted hydrogen was shown at the outlet of the second working purifier, we threw the first (foul) purifier out of action, placing another fresh filled box at the end of the series. The foul material was then turned out, and the purifier again filled with revivified oxide ready to take its place at the end of the next change. The purifiers about this time (spring of this year) were beginning to require refilling more frequently; and on testing the material, we found it to contain from 40 to 45 per cent. of free sulphur in the dry state. The system of injecting air into the idle box had only been tried, when a paper on "Economy in Oxide Purification," contributed by Mr. H. L. Rice to the Ohio Gaslight Association on March 26 of this year, an abstract of which appeared in the "JOURNAL" for May 3, led to further experiments.

The inference drawn from this paper was that a more effective revivification of the foul material *in situ* took place with the air in the presence of the purified gas than in the presence of unpurified gas; and following out this argument, we attempted to inject air at the inlet of the second working purifier by means of a steam-jet. But the back-pressure at this point was too strong, and so we had again to revert to the apparatus for injecting at the inlet of condensers, and allow the air to travel with the gas; and we find that while the air has little or no effect in the first purifier—*i.e.*, in presence of foul gas—it revivifies the oxide in the second box.

To follow out this system, we had first to see that all purifiers were clean but one; and this one we placed as second in the series. The action then was that the first purifier took up all the sulphuretted hydrogen in the gas, and the mixture of air and purified gas passing into the second box revivified the material there, and we had the third as a clean box, while the fourth (out of action) was also clean and ready for action. Before the first box becomes fouled, the second shows clean at the outlet, and whenever the first shows foul, it has to take a second place by the centre-valve being reversed a quarter-of-a-turn, and so on, continuing the turning of the valve backward at each change—thus always putting the clean purifier in front of the foul one, instead of at the end of the series as in the old system.

When we began this system in June last, our material in the two bottom tiers of each box was the oxide which showed the 40 to 45 per cent. of sulphur, while the top tier had equal parts of this material and of fresh oxide. We continued without emptying the boxes from June 23 to Oct. 12, and purified 14,404,000 cubic feet of gas; and then, in view of the approaching winter, it was deemed advisable to empty and refill all the boxes. Two of the boxes were in splendid condition. One box was a little stiff in the bottom tier, while the fourth, which had been in action as the first purifier during the greater portion of the aforementioned period, was hard all through, especially in the bottom tier; but with it all we never had any trouble from back-pressure.

### *Discussion.*

The PRESIDENT said he had great pleasure in moving votes of thanks to Mr. M'Farlane and Mr. Bell for the excellent papers the members had had. Both had given them an account of experimental work; and probably the educative value of such work was greater than that of any other sort of research. In all work of this kind, the results of tests must be fully stated. The value of such work, to those who had not had the privilege of making tests, depended, to a very great degree, on the expressed statement of all the conditions. The discussion would probably elicit such fuller information on the tests as it was desirable to have.

Mr. J. M'LEOD (Provan) said with regard to Mr. M'Farlane's paper, taking the most important point in it—viz., where he came into collision with Sir George Livesey—it was most important to know if the conditions of the experiments were equal. He (Mr. M'Leod) did not know exactly either Sir George Livesey's conditions or those of Mr. M'Farlane; but supposing, in dealing with oxide alone, Mr. M'Farlane were using, for washing the gas, liquor of only 2° Twaddel, and supposing Sir George Livesey, experimenting on a large scale, as he knew was done in London, was using two Walker scrubbers, with pure water going into the first, had a liquor of as high as 17° Twaddel running off at the second, what would be the difference between the carbonic acid at the outlet in each case? The only experiment that he had conducted this season gave, with unpurified coal gas entering the scrubber, 2077 grains, and at the outlet 472 grains, per 100 cubic feet—that was to say, the gas actually lost about 1600 grains of carbonic acid passing through the two scrubbers. This showed the important part played by the washing of gas with strong ammoniacal liquor. In Mr. M'Farlane's case, provided the liquor was only 2° Twaddel, the amount of carbonic acid removed would be very much less, and consequently he had a much lower illuminating power. Passing from this point, and coming to Mr. M'Farlane's conclusion regarding the use of oxide, he thought the whole trend of chemical manufacture at the present time was to save every possible bye-product. Now, it seemed a great waste to throw away the valuable sulphur which could be got by using oxide of iron; and if the cost of lime and oxide were equal, then he would most unhesitatingly say, "Go in for oxide." By using this they obtained a most valuable bye-product, and they had a much more scientific method of working. He should like to hear from Mr. Bell if he had the relative costs before they dropped the use of lime and after they started the use of oxide.

Mr. C. FAIRWEATHER (Kilmarnock) said the thought occurred to him that conditions in manufacturing operations varied as time went on. Perhaps thirty or forty years ago, as works were being placed, they were put out into the country; but, as the towns were reaching them, they had to conform to conditions which did not previously exist. He believed that what had done as much

as anything for the introduction of oxide at Airdrie had been the desire to keep down all possible complaint of nuisance in connection with the gas-works; though the effect of a gas-works being in a neighbourhood seemed to be that it was, more or less, an antidote to epidemic diseases. He had noticed in Kilmarnock that the men employed in the gas-works very largely escaped epidemics. As to the use of lime in deep layers, he had occasion to employ it 2 ft. 6 in. deep. It was Irish lime; and it did not answer at all. They tried Scotch lime; and they found that, while it worked up its proportion, the Irish lime got into a clotty mass, and was not doing its share of the work. Working with Scotch lime, they secured very good results; but they did not see their way to change to deep layers. Mr. Bell seemed to have difficulty in getting air into the suction side of the exhauster. Would it not be possible to utilize the gas at the pressure side of the exhauster? He expected that Mr. Bell might have made some reference to the fact of the carbonic acid not being entirely taken up by the oxide of iron. If he could give them some information as to the percentage of air which he used, this would be a valuable point.

Mr. DEWAR (Glasgow) asked whether the reduction in the percentage of carbonic acid might not be due to carburation. Very possibly carbonic acid might act as a carrier.

Mr. W. A. WHITE (Falkirk) pointed out, with reference to the quotation from Sir George Livesey's remarks, that there was a question as to the percentage of carbon dioxide in the gas to start with. The quantity of carbon dioxide was bound to be different in the gas in London from what it was in Glasgow.

Mr. J. WEBSTER (Provan) asked Mr. Bell how much extra enrichment was required when the carbonic acid was left in the gas, and whether it paid to put in the extra enrichment instead of using lime. In one town in which he was, there were two gas-works, both under one Corporation, and both using carburetted water gas. In one of them oxide of iron was used first, and lime afterwards, and in the other, no lime was used, the carbonic acid being left in; and the engineer of the works claimed to have as good results by putting in a little extra oil, and thereby working up his illuminating power. It might be a very fine point to know whether it would pay best to put in extra enrichment or to use less enrichment and take out the carbonic acid.

The PRESIDENT thought there were a number of points that might be introduced into the discussion. What about the construction of purifiers? and about dry seals *versus* water seals? also about the area of purifier required per 1000 cubic feet in 24 hours with lime, and also with oxide? There was the other point that someone might be able to throw some light upon—how much gas of average quality they could purify per ton of lime shell. There was, again, the price obtained for oxide after it had got from 50 to 60 per cent. of sulphur in it.

Mr. A. SMITH (Tradeston) said he had had the pleasure of reading Mr. M'Farlane's paper some days ago, and going over the results he obtained. It occurred to him, regarding the loss sustained in the candle power, if the apparatus could not have been aranged so as to put the gas back again, through lime, to see if the illuminating power might be increased. But time did not permit of this. Mr. Bell did not touch upon how the carbonic acid was removed, and how he managed to bring up the illuminating power; also the percentage of air was not given. He had experience some years ago of working with oxide of iron; but, of course, he did not revivify *in situ*. Three purifiers in action and one off, with lime in the bottom tier, and oxide of iron in the other two, made a very good way of working. This method overcame the difficulty of having too much carbonic acid.

Mr. D. VASS (Airdrie) said it would be well to know the nature and the extent of the experiments conducted by Mr. M'Farlane, because they seemed to almost contradict themselves. Of course, one was not surprised at what an experiment might show, because their own working, as brought out in the paper by Mr. Bell, was a surprise to himself. At Airdrie, their work was beyond the experimental stage, because for the last eighteen months they had been using nothing but oxide of iron; and they had found, practically, no appreciable drawback in illuminating power as they changed, first from lime to alternative lime and oxide, and then later on to oxide alone. Their enrichment costs were about the same figure. They enriched by benzol; and it cost less than 1d. per 1000 cubic feet, working with nuts and dross and whole seam coal. Supposing they had lime purifiers, they would require, he was sure, enrichment to the cost of ¾d.; so that the extra cost of enrichment which might be supposed to be required on account of carbonic acid could not be more than ¼d. per 1000 cubic feet. He was sorry he had not brought with him the charges for wages for the period; but they could understand that if they did not require to open a purifier, but only had the matter of turning a valve, from June to October. There was very little in the matter of wages in question. The labour was about half what it would be if working by the old style of turning out the purifiers. Their results bore out the statement which had been made by Sir George Livesey—that there was really a very small reduction in illuminating power by the carbonic acid being allowed to pass on with the gas. They took no step to remove carbonic acid after the gas had reached the purifier. There was a point with reference to the construction of purifiers—that was, the hydraulic seal. They saw how, in Manchester, it had given them something of a fright; and it was a point that anyone constructing new works should keep in view—the putting in of rubber lutes instead of water lutes. With an arrangement such as they had almost perfected, whereby they only required to turn a valve instead of emptying the boxes, they would have purification in sealed vessels, which had for years been looked for.

The PRESIDENT said they had heard nothing of the revivification of lime; but in Paisley this was being done. He visited Paisley about a year ago, and what he saw there was not very fresh in his mind; so that he might possibly not be correct in all that he said. In the Paisley Gas-Works, they used both lime and oxide—having, he thought, an equal number of boxes of each. He believed the gas was passed through a considerable number of purifiers, in series; but his memory was not very clear on the point. The lime purifiers were filled with lime about 3 feet deep, on one tier of grids; and the gas, instead of passing up through the lime, went down through it. He thought it passed through the oxide first, so that the oxide took up all the sulphuretted hydrogen and the lime the carbonic acid. In this way, neither the oxide nor the lime boxes required to be opened very often, because there was such a large quantity of lime in the boxes; and when the lime boxes gave trouble, by back-pressure, having got crusted on the top, he understood the method was simply to raise the cover of the purifier and break the crust on the top, with, he supposed, rakes. Then the lime was burnt over and over again; and in this way a very much smaller quantity was required. After having been burnt a few times, it had a very yellowish appearance, almost like flowers of sulphur. He believed the system worked very well in Paisley. Then the area required for lime purification was given by one authority as 0·4 cubic foot of lime per 1000 cubic feet of gas per 24 hours; and another (he thought Mr. Newbigging) gave it as 0·6 for the same quantities. He calculated what they had at Provan; and he found it was very nearly 0·5. A fair quantity of gas for a ton of lime shell was 300,000 cubic feet; and the works in Glasgow averaged about this quantity. As to the experiments made by Mr. M'Farlane, it would be interesting, as Mr. Vass pointed out, to know on what scale they were made; and what percentage of carbon dioxide and of sulphuretted hydrogen existed in the gas before entering the purifiers. He thought it quite probable that all the sulphuretted hydrogen was extracted in each of the four tests. The sulphur which was left must have been sulphur compounds other than sulphuretted hydrogen. If this were so, they could understand the increase in the fourth box, because there would be no sulphide of lime to take up any carbon disulphide. The decreased illuminating power in the fourth box would, of course, be due to the fact that oxide of iron did not absorb carbonic acid; but probably in London, and elsewhere where oxide of iron only was used, the greater proportion of the carbonic acid was taken out in the scrubbers—the liquor being worked up stronger so that it had a greater affinity for acids. Perhaps Mr. Bell could give them some information as to whether a larger scrubbing plant was required with oxide only, or whether they were working up the liquor in the last scrubber to a greater strength, so as to absorb the carbon dioxide before entering the purifiers. In none of Mr. M'Farlane's tests was the sulphur content of the purified gas excessive, in view of the quantity allowed by the London Gas Referees. He thought Mr. Bell might have added to the value of an already valuable paper had he given them the quantity of air required to revivify the oxide. Then there was one point which had not been touched upon—the influence of nitrogen, which was drawn in as well as air. Had the nitrogen an effect similar to carbon dioxide, in reducing the illuminating power of the gas, or did it become carburetted, and in that way was the gas not affected? Then there was the question of heating. Had no danger in that way happened in Airdrie? There was also the question, with oxide, of back-pressure when the oxide became hard all through. Did the back-pressure not rise when this took place? He imagined it must do so. He supposed that the steam which was blown in kept the oxide in an efficient condition; otherwise it would become dry, and would not, of course, absorb sulphuretted hydrogen.

Mr. M'FARLANE, on being called upon to reply to the discussion, said that at the place where they used lime 3 feet thick he was pretty sure they had little trouble with back-pressure. Sir George Livesey did not say that the introduction of 1 per cent. of carbonic acid reduced the illuminating power; he stated that 1 per cent. was said to reduce the illuminating power 6 per cent. His own remark was that the gas purified by lime and oxide contained 0·8 per cent., and that the gas purified by oxide alone contained 4·2 per cent. His experiments were carried out, of course, on a small scale, in the coal-testing house at Tradeston. One retort charge was 22·44 lbs. He made seventy tests altogether; but the figures submitted were the average of three or four tests. There was a condenser and a scrubber. The gas was washed, of course, with water, not with liquor. There were two purifiers—not very large—and, of course, he could only work with two. In making the experiments, it was not his desire to prove that Sir George Livesey was wrong; but when he read a statement he always liked to deduce a corollary for himself.

Mr. BELL said he was sorry that he had no data there as to the relative cost of working with lime and oxide; but they could readily imagine the economy being carried out in Airdrie when they considered that they had no lime to buy, which was a very expensive commodity. The purifying material had been in use for eighteen months. Then the working costs were greatly reduced, owing to their not having to empty the boxes so frequently

as they used to do. When they had difficulties in the admission of air at the exhausters, they had no steam-jet at that point; and it was not a success at the condensers either until they introduced the steam-jet. It required a very elaborate apparatus to introduce air at the exhausters, to work against the back-pressure.

Mr. FAIRWEATHER said the point he was making was whether they could not use the back-pressure at the outlet of the exhauster to put in air at the inlet of the exhauster.

Mr. BELL thought this might be arranged. As to the cost, they found it cheaper to inject benzol than to extract carbonic acid. The percentage of air injected was from 1½ to 2½. They made no alteration in their scrubbing or washing area. They worked their scrubber exactly in the same way as they did with lime. They did not work their liquor up any stronger. As to nitrogen, this, of course, was a thing he did not take any notice of; the percentage of it was so small that it had no detrimental effect worth heeding. They had had no dangerous results from heating. It took a good few hours before the oxide was red hot, which gave them plenty of time to get their purifiers emptied. They had had no increase of back-pressure worth speaking about. In fact, they never noticed any difference in the back-pressure at all, which, he believed, was owing to the amount of sawdust—about 50 per cent. —which they mixed with the oxide. Then, although it did attain a condition of hardness, the gas could always get through. The steam had a tendency to keep it in suitable working condition. He did not think that putting lime and oxide in the same purifier was a very good system; there was a possibility of the lime and oxide getting mixed, which was detrimental to the oxide as a marketable commodity.

Mr. M'FARLANE asked to be allowed to state that one and the same coal was used throughout his experiments. It was a coal which contained a high percentage of sulphur—higher than most of their coal. In Glasgow, the gas did not contain 10 grains of sulphur per 100 cubic feet. On an average taken over twelve months, it was about 5 grains at Tradeston, which was well within the statutory limit.

Mr. VASS would have liked that some notice had been taken of the really novel part of their working, which was in putting the clean purifier in front of the others. It was by introducing the clean purifier in front, to take the sulphuretted hydrogen out of the gas, and allowing the pure gas and the mixture of air to go forward to the dirty box, to revivify it, that they worked.

Mr. FAIRWEATHER said the point impressed him while the paper was being read. He presumed that the process of changing the purifiers would be more frequent.

Mr. BELL said he had to shift the valve sometimes once in twelve hours; but all that nad to be done was simply to move the valve backwards.

This closed the proceedings.

### Eastern District.

The members of the Eastern District, to the number of about fifty, carried through a most pleasant and instructive visit to the collieries of the Lothian Coal Company, Limited, at Newbattle, on Saturday afternoon. On alighting from the train at Eskbank Station on the North British Railway, about half-past two, they were met by Mr. J. Callander, the Secretary of the Coal Company, who gave them a very hearty welcome. Driving to the collieries in conveyances provided by the District, the visitors were introduced to Mr. Mackay, the Works Manager, who, with some of the Overseers, took the party in charge, and showed them over the works—first above and then below ground. For their information notes had been prepared as to the equipment and working of the collieries; and these were handed round. From them it appeared that the coalfields under lease by the Company extend to 14,750 acres, and that the lower seams, which include the well-known Newbattle cannel, are believed to exist beneath the whole of that area; the upper seams being more limited in extent. The lower seams are worked chiefly by means of the Lady Victoria Pit, which was the first place visited. The shaft of this pit is 20 feet in diameter, and descends to a depth of 1656 feet. The pit-head works consist of up-to-date steam and electric driving plant; appliances for the automatic working of the coal-hutches on the go-and-return system; travelling bands, conveying the coal forward, giving opportunity for the picking out of dirt and refuse; and screening and washing plant. The yard is lighted by Lucas self-intensifying incandescent gas-lamps. At the adjoining pit of Lingerwood are steam-engines that compress air which is used for the work of pumping and hauling the hutches underground, and also the ventilating plant. There is likewise a brick-works, making 10,000 bricks per day.

Underground the party walked for a mile along the workings, for the most part in a brick arched tunnel, lighted by electricity. Returning to the surface, tea, provided by the Company, was served in one of the buildings—Mr. Callander presiding. At its conclusion,

Mr. A. MASTERTON, the President of the District, said it would be discourteous and ungracious to leave the Newbattle Collieries without recognizing the extreme kindness shown to the members by according a unanimous vote of thanks to the Lothian Coal Company, through Mr. Callander, their Secretary. By this gentleman's instrumentality, they had been granted the privilege of inspecting these works; and they gratefully appreciated the favour bestowed upon them. They had also a word of thanks to Mr. Mackay and his staff of Overseers, who had added to the enjoyment and profit of the visit, by their lucid and careful explanations, and their obliging and affable escort. He was sure they all went away feeling that they were richer in their intellectual possessions since they had seen and examined in detail the various processes by which the earth was made to yield up her produce for the use of man. The Newbattle Collieries were among the best of the kind in the country, and were equipped with all the modern appliances, on a gigantic scale, for expediting work and saving labour. He concluded by wishing the Lothian Coal Company unlimited success and prosperity in future.

Mr. CALLANDER, in response, said he was sure he expressed the feelings of all who had accompanied the visitors on their round when he said that they valued very highly the vote of thanks so felicitously proposed by Mr. Masterton, and so heartily accorded. They had many visitors there, from far and near, but there were none they welcomed more than those connected with the gas industry. They had had very close commercial relationship with that industry since the introduction of gas lighting in Scotland. Nature had been very kind to them there, in depositing large seams of rich cannel, as well as other coal, which formed the raw material of the industry. The Lady Victoria Pit, though a modern one, and fitted up with all the newest appliances, was only the latest development of a business which had been carried on since the twelfth century. The business was commenced by the monks of Newbattle some 700 years and more ago; and it was very remarkable that during all the intervening period, it had only changed hands twice. The monks carried it on from the Twelfth Century till the Reformation; and the Lothian family continued it till it was taken over by the Company in 1890. They were very pleased that the members had honoured them with a visit. They had tried to show them all that could be shown in the very short time at their disposal. Great developments had taken place in the gas industry since William Murdoch's great discovery; and when they saw so many young men there who were anxious to probe the secrets of Nature and of matter, he thought they might safely prophesy a still greater future for the gas industry. They might congratulate the members on being connected with industries which were so useful generally. The gas manufacturer followed up where the collier left off, by the carrying on of the process, and by the application of the breaking up of the coal into its component parts, to give light and heat and so many useful residuals. The Company would be very pleased indeed to see the visitors back again at an early date, and they would then endeavour to show them still more than they had seen that day.

Mr. MACKAY also briefly acknowledged the vote of thanks.

The party then returned to Edinburgh, and dispersed at the Waverley Station.

## THE KRUESS ILLUMINATION METER.

In a recent number of the "Journal für Gasbeleuchtung," Dr. Hugo Kruess described a new form of portable apparatus for measuring the amount of illumination falling upon any particular surface—*e.g.*, a school desk; the light being compared with that given by a benzoline lamp. The principle of the device is the same as that employed in Wingen's apparatus, but so modified as to give greater exactness of readings, and a wider range of utility; while the idea adopted in a photometer constructed by Preece and Trotter, of allowing light to fall on an observation surface at any known angle of incidence, has been incorporated with it.

The apparatus is shown in fig. 1 (next page). At the right-hand end of the case is the standard benzoline lamp, the products of combustion from which escape from the short chimney. By turning the buttons to be seen on either side of *m*, the lamp and its appurtenances can be withdrawn from the case, when it appears as shown by fig. 2. The wick of the lamp is adjusted by turning the thumb-screw *t* till an image of the tip of the flame *f*, cast by the lens *e* upon the screen *s* (fig. 2), coincides with a horizontal line *m* (fig. 1) drawn across the screen. After being allowed to burn for 5 or 10 minutes inside the case, a condition of equilibrium between the external and the internal temperature is attained, and the light remains of constant intensity.

The optical part of the apparatus is at the left-hand end of the case, and can be bodily removed by loosening the four thumb-screws shown at the extreme left of fig. 1. When viewed from the inside, this part of the meter has the appearance seen in fig. 3. The upright optical tube has an eye-piece at O, through which the external surface M and the internal surface V may be viewed simultaneously. This can be done either in the manner indicated by the illustrations, in which the two surfaces appear as contiguous semi-circles in the field of vision, or, according to Trotter's plan, by allowing M to be visible through a central aperture in V. M, outside the case, receives the natural or artificial illumination which is falling upon the spot under examination, and which has to be measured; V, inside the case, receives the light from the lamp. The surface V is hinged upon a horizontal axis A, and is supported at its movable end by a kind of cam carried on the horizontal spindle B. Outside the case, B terminates in a milled head to which is attached a pointer (marked *Z* in fig. 1) travelling over the graduated circle T. The positions of the chief marks upon this scale are ascertained when

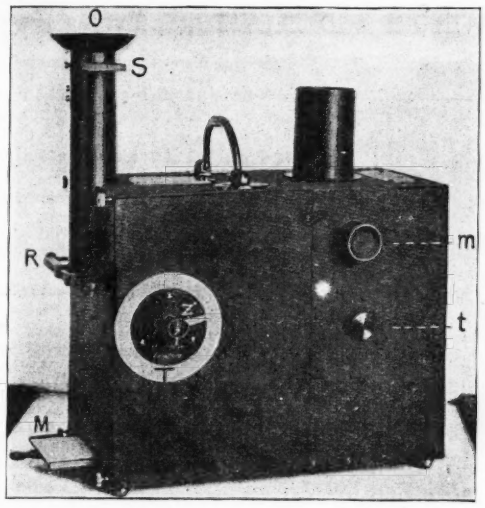



FIG. 1.

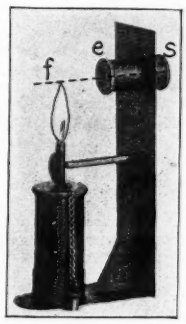



FIG. 2.

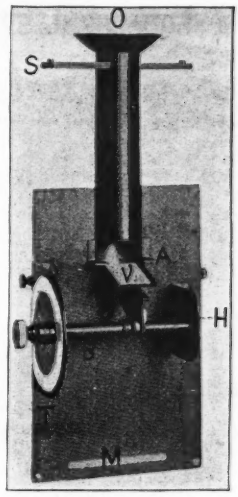



FIG. 3.

the apparatus is made by rotating the milled head until the illumination received by the two observation surfaces is identical, the light falling upon M being equal to a known number (10 to 50) of metre-candles. The cam which determines the angle presented by V to the rays of the benzoline lamp has such a figure that the graduations on T are uniformly spaced; and they can therefore be subdivided easily.

In order to give the apparatus a wide range of measuring capacity, a slide R is fitted at the base of the optical tube, which can be moved into any one of four positions. In one position (marked 1), it presents a clear path for the rays reflected from M to reach the eye; in the second position (2), the rays have to traverse a partially obscured glass, which reduces their intensity to one-half; in the third position (5), a darker glass only passes one-fifth of the light; in the fourth position (10), one-tenth of the light passes. When the illumination falling upon the surface under examination, therefore, is very powerful, the slide R is brought into use; and then the reading of the pointer *Z* is multiplied by the number indicating the action of the obscured glass in the slide.

In Wingen's original apparatus, a red glass was permanently fixed in the eye-piece; for, owing to the impossibility of comparing daylight with the rays of the benzoline lamp, all measurements were made in a red light. Moreover, when Cohn laid down the rule that the mean illumination necessary on school or reading desks was that equal to 50 metre-candles, while the minimum permissible was 10 metre-candles, he meant that the comparison should be made by red light. But since the lamp light is much redder than daylight, daylight is represented by this way of working to be much weaker than it really is. According to Weber, the general illuminating power of daylight is 2·5 times as great as it is represented to be by comparison of its red rays with the red rays emitted by the lamp. If there were always the same difference of tint between the lamp light and the light which has to be measured, a monochromatic process would be sufficient.

In order to circumvent this source of error, the illumination meter now being described is provided in the eye-piece tube with a slide S (figs. 1 and 3), which presents to the ascending rays of light either a plain opening, a disc of red glass, or a disc of green glass. When the two sources of light are not too different in tint, a general measurement of their brilliancy can be made through the plain opening—*i.e.*, in white; but if they differ much, monochromatic comparisons are made in red and in green, and from the results so obtained their total intensity is estimated by the aid of the tables prepared by De Lepinay and Weber.

## DETERMINATION OF THE RATE OF LEAKAGE TO BE EXPECTED FROM NEW GAS DISTRIBUTING SYSTEMS.

The following is a digest of a communication by Herr K. Mattern, the Engineer of the Berlin-Anhalt Engineering Company, to a recent number of the "Journal für Gasbeleuchtung."

It is customary to stipulate on the Continent that new gas-mains in a town distributing system shall not, when brought into use, allow more than a certain small loss of gas by leakage. For large undertakings, a loss of from $5\frac{1}{2}$ to $11\frac{1}{2}$ cubic feet per hour per mile of main is considered admissible; but with small undertakings and mains not exceeding 6 inches in diameter, such a loss would be excessive relative to the output, and the contractor may be required to guarantee that the leakage shall not exceed $2\frac{3}{4}$ cubic feet per hour per mile of main at an average pressure in the main of 2 inches of water. It becomes important therefore for the contracting firm to have a ready means of determining what the rate of leakage from a newly-laid system will be, when the system is brought into use. The test of the main under air pressure affords such a means of determination. This test is commonly for a period of 10 minutes at a pressure of 40 inches of water. A simple formula admits of the loss of gas being calculated from observations made during this test.

It is assumed that the leakage arises from a number of small orifices through which the gas passes out according to the same law as that which applies to the efflux of gas from pipes. The loss of pressure at different pressures then becomes directly proportional to the square root of the pressure. Mariotte's law applies to the increased volume in a main put under pressure. The loss of air is proportional to the loss of gas inversely as the square roots of the specific gravities.

Then, let

$P = h - h_1$ = the difference of pressure in ten minutes.
V = the volume or capacity of the cut-off distributing system in cubic feet.
M = the length of the distributing mains in miles.
$h$ = the pressure at the beginning of the test = 40 inches.
$h_1$ = the pressure at the end of the test, of 10 minutes duration.
$S_a$ = the specific gravity of air = 1.
$S_g$ = the specific gravity of the gas (say) = 0·43.
$V_1$ = the increased volume at a pressure of 40 inches $= \frac{V}{10}$

The loss of gas at a pressure of 2 inches is required to be ascertained.

$$\text{This loss is equal to } \frac{\frac{\sqrt{2}}{\sqrt{40}} \times \frac{\sqrt{1}}{\sqrt{0{\cdot}43}} \times \frac{V}{10} \times 6 \times \frac{P}{40}}{M}$$

$$= \frac{8{\cdot}485\ V\ P}{1659\ M} = \frac{V\ P}{195{\cdot}5\ M} \text{ cubic feet per hour per mile.}$$

[The expression $\frac{\sqrt{2}}{\sqrt{40}}$ should strictly be $\frac{\sqrt{2}}{\sqrt{40 - \frac{P}{2}}}$, because the pressure falls during the test; but as the difference is very small, the simpler expression has been adopted.]

No account has been taken of differences in the barometric height and in temperature. The barometric height affects the result only to a trifling extent, which may be ignored; and the temperature differences will only be of moment if the main is exposed to the direct rays of the sun. If any considerable portion of the main or mains is so exposed, the test should be made in the evening. The air in the mains will usually be colder than the outside air, and hence the air pumped in might appear to affect the result; but actually, as it takes an hour to pump in the air to the requisite pressure, while the test occupies only about 10 minutes, the fall of temperature of the pumped-in air will be quite negligible during the latter period.

The following example elucidates the use of the formula:

M = 4 kilometres = 2·485 miles
P = 30 millimetres = 1·2 inches

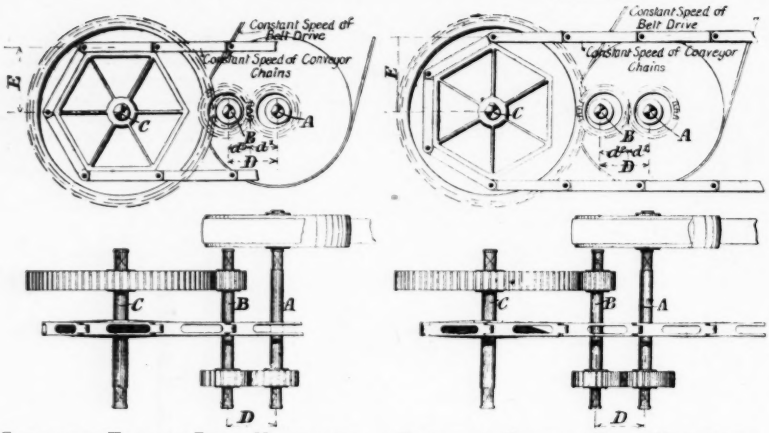
The diameter of the mains averages 80 millimetres, or (say) 3·2 inches; and the volume of the system is therefore—

$$0{\cdot}08^2 \times \frac{\pi}{4} \times 4 \times 100 = 20{\cdot}106 \text{ cubic metres} = 710 \text{ cubic feet} = V.$$

The loss of gas which may be expected per hour and mile is therefore—

$$\frac{V\ P}{195{\cdot}5\ M} = \frac{710 \times 1{\cdot}2}{195{\cdot}5 \times 2{\cdot}485} = 1{\cdot}75 \text{ cubic feet (or 30·9 litres per kilometre).}$$

## EQUALIZING SPUR-GEAR FOR DRIVING CONVEYORS AND ELEVATORS, ETC.




GEAR WITH FLAT OF DRUM UPPERMOST. GEAR WITH POINT OF DRUM UPPERMOST.

A.—Countershaft at Constant Speed of Rotation.

B.—Countershaft gearing with Drum-Shaft.

C.—Drum-Shaft.

D.—Constant Distance between Countershafts.

E.—Variable Controlling Radius of the Drum.

$d^1$, $d^2$.—Variable Dimensions.

[The proportion $\frac{d^1}{d^2}$ increases as the Dimension E decreases and *vice versâ*.]

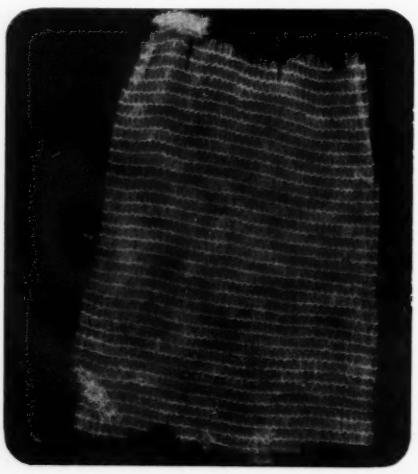
In the last issue of the "JOURNAL" (p. 329), there appeared an illustrated description of the "Tipit" overlapping gravity bucket conveyor devised by Messrs. Robert Dempster and Sons, Limited, of Elland. In connection therewith, the firm are introducing new equalizing spur-gear for driving purposes, of which we are able to give a description. Before doing so, however, it will be well to consider briefly the type of gear now generally employed. As an example, we will select a conveyor built up of links having 12-inch centres, which engage with a hexagonal drum driven by spur-gear at ten revolutions a minute. The hexagon will be found to measure across the flats approximately seven-eighths of the dimension across the points. It follows, therefore, that the speed of the conveyor should vary as these dimensions—that is to say, the instant the point of the drum reaches the top, the speed of the conveyor is theoretically 15 per cent. faster than when the flat of the drum is uppermost. Since, in the example taken, this occurs once every second, the period for this fluctuation is only half-a-second. No one would have entertained such an irregular drive as that depicted; but, in practice, this large percentage of variation in the speed of a conveyor does not occur. Consequently, in accordance with the law of the conservation of energy, this tendency to fluctuate, which is insufficient to accelerate the speed of the whole conveyor in so short a time, must expend itself, by suddenly increasing the stress and strain in the whole chain. This results in heating and fatiguing the wearing surfaces, and all to no useful purpose, which necessitates the use of extra large and strong chains; or, to sum up the effect in a few words, this spasmodic force is applied to wear out the conveyor. Such an arrangement of driving gear, of which there are many thousands now in use, is wasteful of energy and creates excessive wear. It appears at first sight that shorter links would prove beneficial; but, upon examination, it will be seen that the shocks would only be subdivided into a larger number of lesser shocks, which certainly is not a scientific way of dealing with the question.

The improved arrangement of spur-gearing now to be described is designed to impart to the chains a constant and steady pull, through the medium of the usual drum or sprocket wheel. As will be seen from the diagrams, A represents a countershaft which receives its power at a constant speed of rotation from any source to hand; and B is a second countershaft, which is connected to the drum-shaft C by any combination of gearing, such that B completes one revolution each time a point of the drum arrives at the top. Shafts A and B are connected by two equal spur pinions. These pinions are bored out of centre, and keyed in their respective positions. The amount of their eccentricity is so arranged that while D, the distance between their centres of motion, remains constant, the proportion $\frac{d^1}{d^2}$ varies in inverse ratio to the fluctuating controlling radius E of the driving-drum. Under the influence of these pinions, the driving-drum is caused to exert a constant pressure on the chains, and to pull forward the conveyor at a continuous rate of travel. This arrangement is of the simplest possible design, and by its use lighter and longer links may be employed; thus greatly decreasing the size and number of wearing points, and consequently reducing the first cost and maintenance of the installation.

We are informed that the gear will be in action, driving the "Tipit" gravity bucket conveyor in Messrs. Dempster's stand (No. 4) at the Earl's Court Exhibition.

## THE RADIO-ACTIVITY OF OXIDE OF THORIUM.

Over the signature of Mr. C. J. D. Gair, articles have appeared in the "Co-Partnership Journal" of the South Metropolitan Gas Company on "Radium." In this month's issue, Mr. Gair points out that perhaps the most wonderful thing about radium is the



property it possesses of giving off what are known as radiations, which affect a photographic plate in much the same way as X-rays. This property is not, it is remarked, confined to radium alone; for several other elements possess it in varying degrees of intensity. The oxide of thorium of which incandescent mantles are composed has it to a wonderful extent; and the author presents an illustration showing the actual photograph of a piece of a mantle, taken by means of its own radiations. The fragment of mantle was laid upon an ordinary photographic plate, and both plate and mantle were then covered up, and left in the dark for some time, after which the plate was developed in the usual way, with the extraordinary result shown.

## JUNIOR INSTITUTION OF ENGINEERS.

The Inaugural Meeting of the Twenty-fourth Session of the Institution takes place on the 18th inst., when Mr. W. H. Lindley, M.Inst.C.E., the newly-elected President in succession to Mr. Fletcher Moulton, K.C., M.P., will deliver his address. The address will deal especially with continental municipal engineering, in which Mr. Lindley has had long experience. He commenced work in 1870; his first engagement being to represent his father in the construction of the water-works for the city of Budapest. After that he was concerned in several continental water-works projects; and in 1882, the direction of the water supply of Frankfort was handed over to him. The same year he was appointed to the City Engineership. He relinquished this appointment in 1896. In 1880, he took over his father's practice outside Frankfort and abroad, and planned and carried out many works. Apart from the President, there is special interest in the present session of the Junior Institution of Engineers. It was founded in 1884; so that this session the organization celebrates its majority. In view of this, special efforts are to be made to bring the membership up to 1000. Among the visits arranged for is one to the Birmingham Corporation Gas-Works, by permission of the Chief Engineer, Mr. Henry Hack. At the annual meeting on the 21st ult., the officers for the session were elected. We are pleased to note that Mr. Samuel Cutler, jun., was again elected Chairman. In this position, he accomplished in the past year some exceedingly useful work for the Institution.

# REGISTER OF PATENTS.

**Attachments for Gas-Fittings.**—Wakley, W. W., of Westbourne Grove, W. No. 24,346; Nov. 10, 1903.

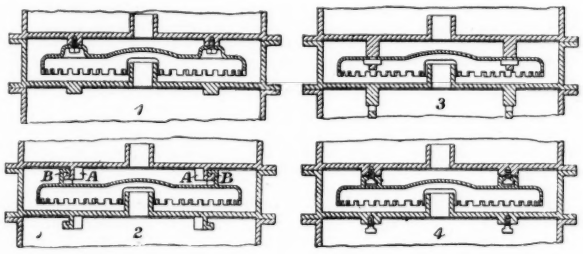
This "invention" has reference more particularly to fittings for use in connection with inverted incandescent gas-lamps; the chief object of the "invention" being to so construct these articles as to cause them to resemble the flexible cords used with suspended electric lamps. Two or more tubes of comparatively small diameter, and preferably metallic, twisted together and formed in sections of convenient length are arranged; suitable means being provided for securing them together, and for attaching them to the gas-supply pipe and the burner or lamp respectively, or for connecting them in successive lengths or sections.

**Ammonia Stills.**—Davis, G. E., of Knutsford. No. 25,996; Dec. 9, 1903.

This invention consists in a modification of the construction of ammonia stills, so as to prevent the insoluble lime compounds from settling into a hard cake, or even thick mud, which is especially the case with column stills like those described in patent No. 16,349 of 1888.

The invention consists in fixing the serrated caps to the plate forming the tops of the chambers in which they rest, so that the serrations hang free in the liquid contained in the chamber. A small rake or special cleaner may then be inserted underneath the caps, in order to withdraw the *débris* that has settled.

There are many methods by which the caps may be fixed to the ceiling of the chambers; but it is always necessary to secure full submergence of the serrations of the cap, so as to allow a free flow for the liquor, and to secure that the gases and vapours passing from chamber to chamber find a ready passage over the caps. Four such methods are shown in the illustration.




No. 1 shows the caps secured by a number of ordinary set-screws screwed on the underside of the tray. No. 2 shows the caps secured by bayonet catches consisting of a circular claw A cast on the bottom of the tray, and engages with a similar claw B cast on the top of the serrated cap. Several pairs of these claws are placed on the same circle, and the cap is secured by elevating it until its claws are in the same plane as those on the tray and then twisting the cap. The claws then become engaged as shown. No. 3 shows a method of securing the cap by a cotter and bolt; the bolt being part of the tray. No. 4 shows another method whereby a T-headed set-screw is made to engage in a corresponding horizontal slot on the top of the serrated cap.

**Gas-Burners.**—Cornell, O. D., of Hartford, Conn., U.S.A. No. 15,685; July 11, 1904. Date claimed under International Convention, July 15, 1903.

This invention relates to gas-burners—more particularly to a device arranged to have certain automatic action dependent upon the flow of the gas through the apparatus and directly dependent upon the temperature induced by the gas. The device may be applied to an ordinary illuminating-gas burner; and whenever the gas is cut off momentarily, or the flame otherwise extinguished, it will react to cut off the supply. A further object is to provide an automatic cut-off for burners which will act under varying conditions of temperature induced by the gas ignited at the burner. A still further object is to provide an arrangement which (applied to an ordinary gas-burner or tip) will not deflect or interfere with the light or cast shadows; and a still further object is to provide in such a device a means for opening, and holding open, a supply-valve, at the same time throwing the parts automatically into position to be released upon a predetermined decrease in temperature due to the reduction of the flame.

**Multiple Supply Gas-Valves.**—Gumprecht, F. G., of Loughton, Essex. No. 17,868; Aug. 17, 1904.

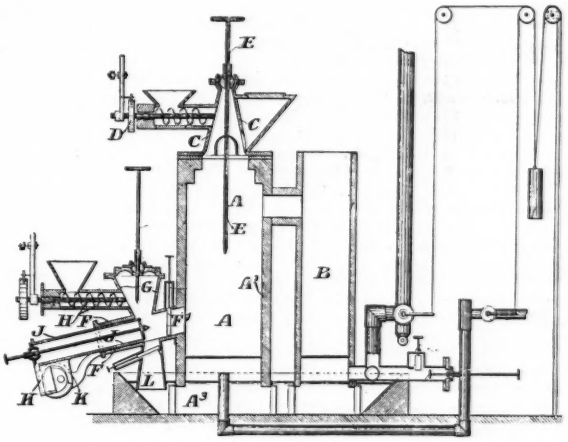
The patentee describes a method he has designed for directing one supply of gas into four or more branches, so that one, two, three, four, or more branches are supplied at will by either turning a key or pulling a chain.

**Regenerative Incandescent Gas-Lamps.**—Neven, E. de, of Asnères, France. No. 18,820; Aug. 31, 1904.

The patentee describes an inverted regenerative incandescent gas-lamp, having an obstructing piece or disc of any suitable shape between the mouth of the burner and the air inlet holes of the bunsen burner, which, by means of apertures in it concentrically around the burner-tube, permits cold air to come into contact with the outside walls of the burner-tube. In this way, the cold air, moving in a contrary direction to the exterior ascending hot products of combustion, is forced to pass downwards along the burner-tube to cool the latter, and at the same time (becoming heated) to feed the flame with hot air.

**Gas-Producers.**—Nash, J. G., of Adelaide. No. 17,712; Aug. 15, 1904.

The object of this invention is to provide a producer for the generation from bituminous coal of a gas free from tar and other impurities "whereby the extensive use of scrubbers and purifiers may be obviated and a gas obtained particularly adapted for motive power purposes with explosive engines." This is accomplished by certain combinations and arrangements of parts, and more particularly the device by which the solid fuel is fed to the producer chambers. A is the first chamber constructed in the ordinary way, and lined with fire-brick material. It is provided with a grate, a well, and inlets for the introduction of an




air blast. The chamber A communicates with a further chamber B by a horizontal flue. This second chamber is also lined with refractory material. The chamber A is adapted to maintain a column of solid fuel which, when fired, becomes incandescent; and into this incandescent body the bituminous coal is fed—preferably in a small or semi-powdered condition. The coke coming into the body of incandescent coal is split up into its constituent gases; and when two chambers are provided (as shown) the gas is passed out through the column of coke arranged in the second chamber B.

The top of the chamber A is provided with a casting, which contains, in one and the same piece, an improved feed-device and a mounting for a poking-rod. The casting consists of a central casing C (preferably conical), which delivers into the open top of the chamber A. The feeding device consists of a hopper having a conveyor screw which discharges through openings in the side of the central casing. In this way, a continuous stream of solid fuel may be fed into the chamber A through the casing C. The conveyor screws are actuated by a ratchet device consisting of a ratchet-wheel D mounted on a shaft. An arm is provided upon the shaft having a pawl engaging the ratchet-wheel D. The arm is slotted, having a pin held in place by a set-screw or nut by which its position may be regulated and by which the connecting rod for imparting reciprocating motion may be caused to impart any length of stroke required and the speed of the conveyor screws adjusted accordingly, with corresponding adjustment of the rate of feed of the fuel.

At the same time, the casting at the top of the producer chamber is provided with an additional hopper through which the solid fuel (in most cases coke) is fed for establishing within the producer chamber the incandescent body. The automatic feed discharging through the central casing C at the top of the chamber may be adapted for continuously feeding in a small quantity of coke, by which the incandescent body may be always maintained at a proper heat.

In operation, the coal is fed in through the hopper G into the cylinder F, and is passed forwards by means of the reciprocating piston or plunger J. In this way, the coal is automatically and continuously delivered into the centre of the body of incandescent fuel within the chamber A at about the zone of highest temperature. The coal being delivered into the body of incandescent coke at this point, the tar and other elements which produce impurities are split up by the excessive heat into constituent gases, with consequent increase of the gas generated. At the same time, a poking-rod may be used for breaking up the body of incandescent coke and admitting of the entrance thereto of the coal as fed in through the cylinder F. The feeding device is shown arranged at a slight angle inclined upwards, for the purpose of giving the coal an upward thrust as fed into the interior of the chamber A; but this feeding device may be arranged at any angle as may be most convenient in practice.

In combination with the feeding device arranged at the side of the generator chamber, there are means for coking the coal at suitable intervals. For this purpose, the cylinder F is provided with a downwardly projecting vent L discharging into a well of water and preferably the well arranged at the bottom of the generator chamber A. This discharge vent is provided with a trap door or valve operated by a screw, by which its entrance may be opened or closed as required. Thus, in practice, a body of coal may be allowed to rest at the entrance of the cylinder F; and the valve or trap door being left open, the heat and flames from the interior of the chamber A serve to coke the coal. At the same time, the gases arising therefrom are caused to pass up through the chamber A and the body of incandescent fuel therein, correspondingly enriching and increasing the amount of gas generated. When the coal has been sufficiently coked, it may be discharged through the vent L by opening the valve or trap door.

The poking-rod in the cover of the hopper G may be used for the

purpose of assisting in the delivery of the coke through the opening into the discharge vent L. The coke discharges through the vent into the well of water, and is thereby chilled; while at the same time the steam generated therefrom passes up through the cylinder F into the interior of the chamber A. When the body of incandescent coke within the chamber becomes depleted, the coke discharged through the vent L may be utilized for feeding into the interior of the chamber through the hopper arranged at the top.

### APPLICATIONS FOR LETTERS PATENT.

22,293.—Ashworth, J. J., Wyke, J. H., and Pilling, G. H., "Gas-governors." Oct. 17.
22,377.—Kay, M., "Inverted lamps." Oct. 18.
22,382.—Davidson, A., and Hatfield, E. W., "Gas-works auger." Oct. 18.
22,407.—Murtha, C. P., "Chimney holder." Oct. 18.
22,474.—Grimsley, J. G., "Warming buildings by water heated by the exhaust from gas-engines." Oct. 18.
22,541.—Zechnall, L., "Chimney for gas-lights." Oct. 19.
22,568.—West, J., "Discharging retorts." Oct. 19.
22,593.—Brotherhood, C., "Producer gas." Oct. 20.
22,606.—Musk, H., "Inverted lamps." Oct. 20.
22,614.—Ehmann, C. P., "Atmospheric burner." Oct. 20.
22,638.—Shiels, A., "Gas-burners." Oct. 20.
22,715.—Tourtel, J. M., "Meters." Oct. 21.
22,723.—Pfaudler, J. M., and Strouss, G. M., "Lamps." Oct. 21.
22,747.—Scott-Snell, E., "Lamps." Oct. 21.
22,767.—Sands, F., "Turbine for gas or oil." Oct. 22.
22,797.—Schwarzhaupt, A., "Lighting and extinguishing gas-lamps from any desired point." Oct. 22.
22,803.—Cotton, F. T., "Gas-cocks." Oct. 22.
22,815.—Boult, A. J., "Gas-purifiers." (La Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.) Oct. 22.
22,843.—Whitfield, C., "Gas-producers." Oct. 24.
22,853.—Boswell, C. R., "Burning gas." Oct. 24.
22,883.—Brown, J. G., "Chimney for lighting." Oct. 24.
22,917.—Oliphant, W., and Scott, T., "Oil gas." Oct. 25.
22,944.—Pavis, J. P., and Edwards, W. H., "Gas extinguisher." Oct. 25.
22,983.—Wehner, H., "Drawing off water from mains." Oct. 25.
22,991.—Howard, A. E., and Whittaker, A., "Gas-burners." Oct. 25.
23,006.—Kinsey, H., Challenger, G., and Nott, J. H., "Generating acetylene gas." Oct. 25.
23,034.—The Richmond Gas Stove and Meter Company, Ltd., and Sherburn, W. H., "Gas-heated water-heaters." Oct. 26.
23,049.—Helps, G., "Gas-meters." Oct. 26.
23,077.—Coiley, F. W., "Inverted incandescent burner." Oct. 26.
23,165.—Hill, G., "Gas igniting and extinguishing apparatus." Oct. 27.
23,176.—Clama, A., "Atmospheric burners" Oct. 27.
23,179.—Wood, E. A., "Incandescent lighting." Oct. 27.
23,184.—Russell, W. H. & G. E., "Producing gas." Oct. 27.
23,212.—Hall, D., and Kay, J. H., "Lighting burners." Oct. 28.
23,327.—Kay, M., "Mantles." Oct. 29.
23,333.—Fletcher, Russell, & Co., Ltd., and Neil, J. & W. R., "Gas-fires." Oct. 29.
23,348.—Greig, D., and Chandler, S. & J., "Automatically lighting and extinguishing lamps." Oct. 29.
23,372 —Steinicke, T., "Inverted incandescent lamps." Oct. 29.
23,379.—Zimpell, K., "Sulphate of ammonia saturators." Oct. 29.
23,391.—Lister, J., "Coal-conveyors." Oct. 29.

**Power Gas for the Potteries.**—The North-Western Electricity and Power Gas Company have decided to raise the necessary funds for paying off the liabilities incurred in obtaining their Acts of Parliament and for laying down plant at some convenient place in the Potteries in order that the practicability of utilizing Mond gas for firing ovens may be demonstrated to those interested in the pottery and kindred trades.

**Gas-Meters in Belfast.**—From a return recently issued, it appears that the total number of gas-meters in use in Belfast on March 31 last was 53,535, of which 40,216 were wet and 13,319 dry. From April 1, 1903, to July 31, 1904, there were 8169 meters tested in the Corporation's own shops, of which 7004 were wet and 1165 dry. Of the former, 451 were found defective, or 6·44 per cent.; while of the latter, there were 566 defective, or 48·55 per cent.

**Deaths from Gas-Poisoning.**—A verdict of "Accidental death by gas poisoning" was returned at Norton-on-Tees, in the case of George Atkinson, a moulder, aged 70, who had been found dead in his bedroom with the gas turned on. Deceased had been rather weak-minded lately, and had been found previously to have got out of bed after retiring, and to have turned on the gas without lighting it. Mrs. Mary White, aged 74, a widow, living at Audley, was found dead in bed; and investigation showed that the chandelier in the parlour was down as far as it would go. The house was full of gas. At the inquest, the Jury returned a verdict that deceased met with her death through accidental suffocation by gas.

**Leeds Gas-Workers and the Unemployed.**—At a conference held in Leeds recently to discuss the unemployed question, a suggestion was made that the gas workers should work fewer shifts, so as to provide employment for more men. Subsequently a meeting of the gas workers was held to deal with this proposal; but owing to the large number of men who were unable to be present, it was felt that it would not be wise to take definite action, and the meeting was adjourned. At another meeting of employees of the various departments of the Corporation, a resolution was put forward protesting against "a seven days' week," and expressing the opinion that the time would arrive when there would be no necessity for Sunday work. This meeting was also adjourned.

# CORRESPONDENCE.

*[We are not responsible for opinions expressed by Correspondents.]*

## Naphthalene Removal.

Sir,—Referring to Mr. Bell's contribution in last week's "Journal," I notice that he also subscribes to the illogical and unscientific doctrine that a solvent of naphthalene at one works is not a solvent at another, and that he has whittled down his own case to the advocacy of a special grade of naphtha, to which he has given an artificial name. His task will be much easier, doubtless, than that of endeavouring to defend a principle.

With regard to the work undertaken by the Southern Association, I should like to take this opportunity of commending it to all who have been interested in the recent discussion. There is a great deal of research work still to be done, which it is impossible for individual engineers to undertake. The Association have the opportunity of investigation at any number of works, comparisons can be made of methods of working, arrangement of plant, and the effect of these on the production and ultimate absorption or deposition of naphthalene. Funds, I believe, are wanted, and subscriptions would be welcomed.

The final report of the Southern Association Committee is not likely to be issued for some time. In the meantime, I think it is clear that where naphthalene deposits are of serious importance, they can be prevented by bringing the gas into contact with a supplementary supply of liquid hydrocarbons on the lines first brought forward on a practical scale in 1896.

*Norwich, Nov. 5, 1904.* Thos. Glover.

## Purifiers.

Sir,—I notice in your penultimate issue a letter, with sketch, from Mr. Henry Green, suggesting the conversion of water-lute purifiers to dry-joint ones by means of a flange and gasket, differing from what has been Mr. Green's previous system of a cast-iron top permanently jointed to the sides, but provided with manlids for access.

Messrs. Clapham, in your last issue, gave further suggestions of the same kind, and attributed to Mr. Green the origination of this method of attaching purifier covers.

I have no desire to detract from Mr. Green's originality for his cast-iron tops; but I must at once claim that the attachment of a wrought-iron cover over the whole area by a flange and gasket was of my own origination. I suggested it to Mr. Evans when Beckton was constructed; but he did not take it up. A set of purifiers were installed thirty years ago at Wandsworth by Mr. Freeman, on my system; a set of concrete purifiers at Wapping, built in the early seventies were so covered; and in later years Messrs. C. & W. Walker, the Horseley Company, and others, have constructed such purifiers to my designs in many places—Poplar, Eastbourne, Margate, and elsewhere. Now at last Beckton is to have them on some stupendous dimensions; but there are points of holding-down from the floor through the sieve standards that, if neglected, may lead to disaster.

Messrs. Clapham show concrete; but that will not retain gas unless very specially treated, as I found with a set of concrete purifiers (bottom and sides) which, with dry flange covers, worked for eighteen years at Wapping.

A short time since I had to write to one of your advertisers, who showed my form of cover, as illustrating a point in detail, and which (as in other cases) ignored my origination of the system, which is established beyond all dispute.

*Nov. 5, 1904.* Hy. E. Jones.

## Sulphur in New Zealand Coals.

Sir,—With reference to the letter of Mr. H. F. Hills, in your last issue, as to the quantity of sulphur in New Zealand Blackball coal, I may say that the quantity of sulphur given in the analysis is perfectly correct, and is the mean of three tests. Mr. Hills must know that it would be absolutely impossible to use a coal of this description alone for gas-making purposes. At Christchurch, they tried mixing a certain percentage with other coals containing less sulphur; but even in this way it could not be employed. As it has not been used entirely by itself, I cannot give the quantity of sulphur compounds (other than sulphuretted hydrogen) per 100 cubic feet contained in the gas. The gas distributed in Christchurch is not purified from sulphur compounds (other than sulphuretted hydrogen), and at times contains sulphur ranging from 20 to 50 grains per 100 cubic feet. Not having seen a coal containing so much sulphur, and having all the other properties of a good gas-making coal, I thought it would be interesting to others to know that such a coal did exist.

Robert English,
*Nov. 4, 1904.* Engineer, Christchurch (N.Z.) Gas Company.

## The Testing of Incandescent Burners and Mantles.

Sir,—I observe in your issue of the 1st inst. that Mr. Rettich, in his letter on the above subject, refers to one which appeared in your columns on the 2nd of August last from Mr. Mallol. That letter I had not seen, or I should have taken the opportunity, which I now do, of referring to its subject-matter, as far as it relates to the tests of incandescent burners which I mentioned in May, 1902.

At the time the results referred to were stated, I had no doubt as to their correctness; but since then I have had opportunities of personally investigating the matter, which have caused me to regard them with less confidence. Whether the abnormally high figures were affected by scattered and reflected light, or by the difficulty of reading the photoped with two different coloured lights, or perhaps by both of these elements, I am not in a position now to determine. I do not

think, however, that there need be any doubt as to the *relative* value of the results or of the conclusions drawn in favour of absolute control over the gas supply. It was to ascertain the value of governing the gas supply that the experiments were instituted; it being often stated by experienced persons using the incandescent system that a governor is undesirable. From what I now know of the question, I should think it desirable that the experiments should be conducted afresh, by means of a photometer in which the colour difficulty is eliminated, and every precaution taken to prevent reflected light gaining access to the photo-ped or disc-box.

I am sorry that I am not able to give any confirmation of the high results; but that may to some extent be accounted for by the fact that I have not had the same quality of gas at my disposal. The gas used in the Halifax tests was of high calorific power, made from coal and cannel. Under all the circumstances, I think it would be best for your correspondents and others who have to deal with the subject to regard the tests in the qualified way I have attempted to describe; and I thank them for the reasonable manner in which they have written upon the matter.

5, *Victoria Street, S.W., Nov.* 3, 1904. THOS. HOLGATE.

## Carbonizing Coal in Vertical Retorts.

SIR,—At various dates, you have published valuable information and comments on the trials with the Settle-Padfield retort at Exeter. I, no doubt like many other of your readers, have perused what has been written with considerable interest; and I appreciate to the full the splendid results shown. Yet in some respects the subject keeps me in wonderment; so that, not seeing anything relative to it of late in your "Correspondence" columns, I feel constrained to ask a few questions.

I allude especially to the high yield of gas per ton of coal, and also to the yield per floor space of retort and time, when compared with horizontal retorts; for the gain attained in these respects seems to me most wonderful and satisfactory—the more so when I reflect and see that but a fractional part of the walls of the retort are or can be made use of under the conditions existing.

I am relying upon the illustrations for my information; and in them it is shown that about a 4-inch layer of coal is undergoing carbonization, while resting upon a bed of incandescent coke. Is it not a little strange that so small a carbonizing area should give such uplifts in these returns? And the very fact of these high results being claimed, in my mind and constantly, prompts the question, Is this the best form of retort that can be employed with the intermittent system of charging? On my part, I do not believe that it is, or anything near the best that it is possible to arrange; and I am prepared to state not only my reasons, but also to make some suggestions on the subject, if you think them of sufficient interest for insertion.

We are informed that the "coke" is improved in this system. Therefore, I should like to learn on that point as follows: Say divide the whole of the charge of coke to be drawn into four equal parts or layers—one above the other. In what kind of condition in respect to quality is the bottom layer found to be, after the three and more complete hours of baking that it must perforce stand while the further three hours' accumulation and carbonizing are taking place. I cannot, by any stretch of the imagination, conceive its improvement by such lengthy immersion at high temperature after its complete carbonization.

*Bradford, Nov.* 5, 1904. THOS. REDMAN.

[We shall be glad to receive the further suggested contributions on this most interesting subject.—ED. J.G.L.]

## Another Phase of the Naphthalene Question.

SIR,—A friend of mine has called my attention to the fact that there has been considerable discussion in the "JOURNAL" lately on the subject of naphthalene. In connection therewith, I wish to raise a point, which, however, is not of a technical character.

The firm whom I represent has establishments in various parts of the country, at many of which we use gas purchased from the local authorities. Recently at one of these establishments the gas failed throughout the whole of the building, and business had to be practically suspended until we could procure the assistance of a gas-fitter, who found that the stoppage was due to naphthalene in our pipes. We wrote to the gas manager, telling him what had occurred, and pointing out the great inconvenience which had been occasioned, and at the same time asked him whether in future he would attend to any failures, and put them right for us free of charge if they were found to be due to naphthalene. Much to our surprise, however, he stated, in reply, that anything done on our side of the meter, from whatever cause, would have to be paid for by us.

We have experienced trouble at other places on account of naphthalene; but our treatment in the case I have mentioned is so wholly opposed to the courteous manner in which we have been met when dealing with other gas managers, that I shall be glad if any of your correspondents will let me know, through your columns, how they are accustomed to deal with cases of this kind. Has my firm any claim against the gas suppliers for loss sustained through the failure?

*Nov.* 2, 1904. DISGUSTED.

**Nantwich Gas-Works Transfer.**—The Directors of the Nantwich Gas Company have made substantial gifts to their employees on the transfer of the works to the Council. Mr. John Davies, the late Manager, receives £500, in addition to the sum of £1000 which he has agreed to accept from the Council as compensation; the Assistant-Manager and the Secretary are to have 200 guineas each; and other employees will receive amounts which will bring the total distribution up to about £1000.

# LEGAL INTELLIGENCE.

## HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

**Friday, Nov. 4.**

(*Before the* LORD CHIEF JUSTICE *and Justices* KENNEDY *and* RIDLEY.)

### Chepstow Gas Company v. Chepstow Electric Lighting and Power Company, Limited.

Mr. SHIRESS WILL, K.C., who appeared for the defendants, said this was a special case stated by Magistrates for the opinion of the High Court.* The Electric Lighting Company had been convicted for laying their mains in undue proximity to the mains of the Gas Company, and contrary to the provisions of the statute. The Act provided for a penalty during every day of default; and it defined what that daily penalty should be—namely, a penalty after conviction. The Electric Lighting Company were summoned for an offence under the statute, not for daily penalties at all. The Magistrates convicted for the offence, and also for daily penalties. This was the first point that arose. The second was that a conviction for penalty and for future offences was bad upon the face of it.

Mr. MACMORRAN, K.C., for the Gas Company, said there was also the point as to whether the summons was not out of time.

Mr. SHIRESS WILL said the Electric Lighting Company had laid down and constructed new lines and other works in certain streets, in what was said to be undue proximity to the mains of the Gas Company; and it was alleged that they had not conformed to the requirements of that Company for protecting the mains from injury and for securing access thereto. A summons was issued against the Electric Lighting Company on the 17th of June, and before the opening of the case they took the following objections: (*a*) That the Court had no jurisdiction, inasmuch as there was a special method of recovery—though he did not rely upon that now; and (*b*) that the complaint was not made within six calendar months, and that the matter of it had already been the subject of arbitration. He did not rely very much upon that point. It was contended by the Gas Company that the offence was a continuing one, and that therefore the time-limit did not apply; but that if it did, the six months commenced to run from the date of the publication of the award. That was an untenable point, as he submitted. The Magistrates overruled the objections, and heard the evidence. It was proved that the Electric Lighting Company did not give the Gas Company notice, as provided by section 18 of the Act, before commencing to sink trenches; that the wires were laid in undue proximity to the gas-mains, not in accordance with the requirements of the Company; that the Electric Light Company had not altered the situation of the lines of wire since the time of the arbitration; and that the whole of the work of laying the wires was completed by Oct. 31.

The LORD CHIEF JUSTICE asked whether the Arbitrator had ordered the Electric Lighting Company to remove the wires.

Mr. SHIRESS WILL said he did not; there being no power to do it. The mains were in the position in which they were originally laid. The Gas Company went to arbitration; and the Board of Trade appointed Major Cardew to assess the damages under the Act. At the commencement of the arbitration proceedings, a statement was made by the Solicitor for the Gas Company that he did not claim penalties under section 18. The Magistrates considered that the information and complaint were sustainable, and accordingly convicted the Electric Lighting Company—fining them £1 and costs, and imposing a daily penalty of £1 during default. The question for the Court was whether this decision was right in point of law. Section 18 of the Electric Lighting Clauses Act, 1899, provided that where the undertakers require to dig or sink any trench for laying down any new service-line near to any sewer under the control of the local authority or any gas-main lawfully placed in the road, they should, unless it was otherwise agreed, give to the local authority or the gas company three days' notice, and should conform with all reasonable requirements for the protection from injury of any pipe, and for securing access thereto, and should repair any damage that might be done. Sub-section 4 provided for any question in difference being determined by arbitration. Section 5 enacted that if the operators failed to comply with the requirements of the section, they should make full compensation for any loss or damage, and be liable for each default to a penalty not exceeding £10, and a daily penalty not exceeding £5; but it provided that the operators should not be subject to any such penalty if the Court were of opinion that the case was one of emergency, or that the default was due to the ignorance of the operators as to the position of the pipes. His submission was that the Magistrates ought not to convict for daily penalties until after there had been a conviction.

The LORD CHIEF JUSTICE remarked that he did not suppose Mr. Macmorran would dispute that proposition.

Mr. SHIRESS WILL said his second contention was that there could not be a conviction for offences in the future.

The LORD CHIEF JUSTICE asked what was the argument on behalf of the appellants upon the time point.

Mr. SHIRESS WILL said his contention was that the offence was not a continuing one. It consisted in placing the wires in undue proximity to the mains of the Gas Company; and the six months would run from the time the thing was done.

Mr. MACMORRAN said he should not contend that future penalties were recoverable.

Mr. SHIRESS WILL argued that the offence was not severable; further, that it was not a continuing one, and that the Magistrates were wrong in holding that it was. The offence was purged and wiped out by the payment of the amount of the loss and the damages as assessed by Major Cardew. The section protected not merely gas companies but local authorities, water companies, and owners of property. If the Electric Lighting Company did them an injury, the continuing penalties might apply.

* See "JOURNAL," Vol. LXXXVI., p. 972.

The Lord Chief Justice: You say the award is an answer to any penalty?

Mr. Shiress Will: Yes. The Arbitrator found that the works had been constructed in undue proximity to the mains of the Gas Company; and he awarded, by way of damages, £36, and £44 for costs.

The Lord Chief Justice pointed out that the statute imposing the penalty was for the protection of the public.

Mr. Macmorran said section 18 required an electricity supply company, if they laid lines under the street, to conform with the reasonable requirements of gas companies for protection of their property.

The Lord Chief Justice: The section provides that they are not only not to bring them too near, but are to conform with reasonable requirements.

Mr. Macmorran said certainly; and any question of difference arising between the parties was to be determined by arbitration. Subsection 5 provided that if default was made in compliance with the requirements, compensation was to be paid; and, in addition, there was to be a penalty.

The Lord Chief Justice asked whether the Gas Company required the Electric Company not to lay their wires too close to the mains.

Mr. Macmorran replied that they did.

The Lord Chief Justice doubted whether a conviction for undue proximity alone would have been good.

Mr. Macmorran said that might be so; but the Arbitrator had found that the Electric Lighting Company had not conformed to the reasonable requirements made by the Gas Company for protecting the mains from injury, and for securing access thereto. The Gas Company asked the Electric Lighting Company to relay their lines in a proper manner, and to give the statutory three days' notice. Particulars of the alterations required were given; but the Company refused to perform them. After the arbitration, the Gas Company again called attention to the fact that their requirements had not been complied with.

The Lord Chief Justice asked whether the Gas Company contended that, notwithstanding the payment of £36, they had the right now to have wires removed.

Mr. Macmorran said that was his contention. It was quite obvious that the penalties were in addition to damages. Damages were only assessed up to the date of the award, and not on the theory that the pipes were to remain where they were. It would be a strange thing if, after the Arbitrator had found the pipes were in undue proximity, he should only award a small sum. He also contended that the offence was of necessity a continuing one. If a person had a right to require another to do a certain thing, and he had so required him to do it, the law would imply that he ought to have a reasonable time within which to accomplish it; but so long as he failed to comply, there was a grievance.

The Lord Chief Justice: What do you understand to be the default?

Mr. Macmorran replied that it was in not opening a trench and shifting the electric main away from the gas-pipe.

Mr. Shiress Will having been heard in reply,

The Lord Chief Justice said he was of opinion that the conviction must be affirmed. The information which was laid under section 18 of the Electric Lighting Clauses Act, charged that the Electric Lighting Company had laid down new lines in undue proximity to the gas-mains, and had not conformed to the requirements of the Gas Company. One could see, of course, how the statement as to laying down mains in "undue proximity" got into the summons. It was because there had been proceedings before Major Cardew, who had found as a fact that the wires were in undue proximity, and the requirements of the Gas Company had not been obeyed. He quite acceded to what was the substantial argument of Mr. Shiress Will—that the offence contemplated by the section was not one for laying down wires in any given position, but it provided certain machinery whereby people who were affected might make requirements on notice; that they had a means of recovering compensation for any damage done; and that there was a provision for arbitration. Sub-section 5 made it a substantive offence for default in complying with the requirements of the section, or rather the requirements of the Gas Company for the protection of their mains. The Court had to consider whether or not the time-limit of six months applied, so as to make the conviction either bad upon the face of it, or bad on the facts stated by the Magistrates to show that there had been a complete offence for more than six months. It was contended by Mr. Shiress Will that there could be no summons for penalty because there had been the arbitration before Major Cardew. But they were all of opinion that this was not a good point. Not only did the section provide that the penalty was to be in addition to compensation, but it was obvious that the provision for penalty had no relation to compensation. The penalty was for the purpose of enforcing obedience to some requirement which did not involve compensation at all, and which might yet be reasonable—as, for instance, putting mains at some given distance from the gas-pipe. It was also contended for the appellants that the conviction was bad because, in addition to the penalty of £1, there was one of £1 for every day's default. Mr. Macmorran had admitted that it was a conviction for an offence, and that he could not add penalties for future offences, especially as it was provided by the Act that the penalty for default was after conviction. Then it was said that the summons was taken out too late; and many cases had been cited upon the point. The question was whether Mr. Shiress Will was right in his contention that the proceedings were too late because the conviction either related to something which was done as far back as the 2nd of October, or mentioned on its face that the Electric Lighting Company did, on and after the 2nd of October, make default in not complying with the requirements. On either ground, he thought this was an objection which could not now be taken. To say that the time began to run from the date of the requirement itself, would be impossible. One could well imagine a case where the work would occupy a considerable time. He thought a broader view should be taken—namely, that the requirement was, for the purpose of this offence, in the position of disobedience to an order. He could imagine a thing which was ordered to be done requiring so little time to perform that the Magistrates might well think there was a complete offence within a certain time more than six months before the commencement of the arbitration. They might consider that the disobedience to the order was of such a character that there was a completed offence within a certain time. Having regard to the language of the order and to the facts as found by the Magistrates, he thought the exception (if it was one) could not be relied upon. There having been a request to do certain works on the 2nd of October, the parties went to arbitration, and the award was not made till the 12th of February. The appellants were disputing that the electric wires were too near the gas-mains for 4½ months after the question was raised; and then there was a requirement made to them to do what the Gas Company wanted after the date of the award. It was not possible to construe the summons as alleging a completed offence on the 2nd of October in respect of which a penalty might have been inflicted; but there was nothing to show that the offence was complete more than six months before the summons was taken out.

Justices Kennedy and Ridley concurred.

The appeal was therefore dismissed, with costs.

## HIGH COURT OF JUSTICE—CHANCERY DIVISION.

**Friday, Nov. 4.**

(*Before Mr. Justice* Warrington.)

### Clay and Others v. Grand Junction Water-Works Company.

This was a motion on behalf of Sir Arthur Temple Clay, Bart., Mr. William Whitworth, and Mr. William Wright, on behalf of themselves and other holders of shares in the Grand Junction Water Company, who dissented from the scheme for the application and distribution of the compensation to which the Company are entitled under the Metropolis Water Act, 1902.

Mr. Norton, K.C., and Mr. Muir Mackenzie appeared for the plaintiffs; Mr. Haldane, K.C., M.P., and Mr. R. J. Parker represented the defendants.

Mr. Norton said the defendants, together with other holders of "D" shares, had by writing addressed to the Secretary of the Company required that the said scheme should be submitted to a meeting of the holders of these shares. The meeting was duly held, and a resolution was passed dissenting from the scheme, and deciding to apply for an injunction to restrain the Company, until the trial of the action or further order, from proceeding to apply and distribute the compensation to which the Company were entitled under the Act, until the scheme and the matter of the dissent of the holders of the "D" shares had been submitted by the Directors of the Company to the Chancery Division of the High Court by petition, pursuant to the provisions of the Fourth Schedule of the Act, or for such other order as might be necessary to give effect to the right of the plaintiffs and the holders of the "D" shares. The point his Lordship had to decide was whether or not the plaintiffs had a right, under the Act, to have the scheme of distribution submitted to the Court. Section 5 of the Act provided for payment by the Metropolitan Water Board to the Companies of money or stock, and that this should be applied or distributed in the manner provided in the schedule named. This schedule set forth that within three months after the ascertainment of any compensation to which a Water Company became entitled under the Act, the Directors should prepare a scheme for the application and distribution of the compensation, and send by post a copy to each shareholder. Then it continued: "If within one month after the sending of the copies aforesaid any shareholder or shareholders, the aggregate nominal value of whose shares is not less than £20,000, shall, by writing addressed to the Secretary of the Company, require that the scheme be submitted to a meeting of the shareholders, or (if there are more than one class of shareholders of the Company) of the class to which such shareholders belong, the Directors shall forthwith summon such meeting accordingly, by giving not less than 14 days' notice by post to each shareholder of the Company or to each shareholder of the class concerned." Now came the words on which the present dispute turned: "If a majority in value of the shareholders, or of the shareholders of a particular class, as the case may be, by resolution passed at such meeting, dissent from such scheme, the Directors shall forthwith submit the matter by petition to the Chancery Division of the High Court, and the Court shall, after hearing all proper parties, make such order as to the application and distribution of the compensation to which the Company are entitled under this Act as, under all the circumstances of the case, and having regard to the various interests of the parties, and the nature of such interest, may be considered just and equitable." The point was, What was the meaning of the words "majority in value of the shareholders"? Plaintiffs contended that it meant a majority in value of those present at the meeting; and not a majority of the whole of the shareholders or of the whole of the particular class in question. The resolution of dissent had to be passed at a meeting; and it was obvious that those who did not attend it could not hear the arguments for and against the scheme. The facts were these: The capital of the Company was £1,300,000, divided into four classes. Class "A" were £50 shares, with a dividend of 10 per cent.; class "B" were £25 shares, with a dividend of 10 per cent.; class "C" were £25 shares, with a dividend of 7½ per cent.; and class "D," to which the plaintiffs belonged, were £50 shares, with a dividend of 7 per cent. Of the "D" class there were 6000 shares of £50 each, amounting to £300,000. The dividends were payable in this way: Everybody got 7 per cent. first; then if there was anything further, "A," "B," and "C" shareholders got an extra ½ per cent.; and if there was anything further than this, the "A" and "B" shareholders got an extra 2½ per cent. Therefore, though they were not so called, the "D" shares were really preference shares. In providing the scheme for distribution, the Directors had not given any preference to the 7 per cent. shares, but had dealt with all as of equal value. This

was the reason for plaintiffs dissenting from the scheme. His Lordship had not to decide whether or not the scheme was reasonable, but only whether the plaintiffs were entitled to bring the scheme before the Court. In July last the Directors made their scheme for equal distribution; and in August the plaintiffs and others, holding shares of more than £20,000 value—the limit in the Act—gave notice requiring a meeting to be summoned. On the 22nd of September the Directors convened a meeting of the "D" shareholders; and on the 12th of October it was held. At that meeting 75 persons were present, representing shares of the value of £93,700. There were also present 36 persons holding proxies for £15,900 of shares; but it was common ground that the proxies could not count. This was one of his reasons for saying that the schedule meant shareholders present at the meeting. Shareholders to the extent of £72,700 wanted the scheme submitted to the Court; others holding £9650 did not; and others holding £11,350 did not vote at all. All the proxies were for the resolutions; but they could not count. There was therefore a large majority of those present who wanted the scheme submitted to the Court. But what was said on the other side was that there must be a majority of the whole of the shareholders. He submitted that this was not the true construction of the Act. The common law with regard to corporations was that things were done by the will of the majority present at any meeting. If the Legislature had intended it to be an absolute majority of the shareholders, they would have said so clearly, as they had done in other sections of the Act.

Justice WARRINGTON said the point seemed to turn rather on the construction of the provision in the schedule than on the authorities to which Counsel referred. The words seemed against his contention.

Mr. NORTON further submitted that his construction of the schedule was the only reasonable construction possible.

Mr. MUIR MACKENZIE having argued the same point,

Mr. HALDANE, for the Company, said his argument was a very simple one. They were dealing here not with the powers of corporations, but with a very special piece of machinery to enable a special class of shareholders, or the shareholders generally, acting quite apart from the corporation, to put a kind of veto on the act of the Directors, who were the natural persons to distribute the assets. The effect of the Act was to put these Water Companies into a form of liquidation; and the Directors being the persons to distribute the assets, a certain check had been very carefully provided in the interest of dissenting shareholders. The enactment of the fourth schedule had to be considered quite apart from the maxims of the common law. They had simply to look at the Act of Parliament itself; and taking the words as they stood, they were quite simple. All that could be said on the other side could equally be said for his side of the case; and, having regard to the peculiar character of the machinery, there could be no presumption one way or another as to what was meant by the schedule in question. In his view, the words were not in the least ambiguous. They constituted a safeguard which ought to be construed very stringently; otherwise quite unreasonable power would be placed in the hands of a small minority. There were two restrictions imposed upon dissentients—one that their views should not prevail unless they obtained an absolute majority; and, secondly, before they could prevail a resolution must be passed by the absolute majority at a meeting. This was the scheme of the whole thing; and if they ruled out all presumptions on one side and the other, the Act was plain enough, and there was nothing absurd or ambiguous. His construction was not only the literal, but the natural one.

Mr. PARKER followed on the same side.

Mr. NORTON having replied,

Justice WARRINGTON gave judgment. He said the question had given some trouble; but he thought it could be easily solved when one confined one's mind to seeing what was the real question to be determined. When he came to do that, the meaning of the schedule was comparatively easy of solution. The point arose on the words, "if a majority in value of the shareholders, or of the shareholders of a particular class, as the case may be, by resolution passed at such meeting," &c. In the present case, at a meeting of "D" shareholders, a resolution was passed by the majority of the shareholders present dissenting from the scheme of the Directors; but it was not a majority of the shareholders of that class. It seemed to him clear *primâ facie* that, taking the words of the statute by themselves, they meant what they said—a majority in value of the whole number of the shareholders, or of the whole number of a particular class. Was there anything in the subsequent words which would drive one to hold that the meaning of these words was not *primâ facie* what he said it was? The only words on which any reliance could be placed were the words "by resolution at such meeting;" and it was said that these words meant that it must be a resolution passed by shareholders present at a meeting, and therefore by a majority in value of the persons present. But it seemed to him that this was not enough. The Act did not provide for the submission of the scheme to the approval of the shareholders. All that it provided for was the ascertaining whether there was a sufficient preponderance of dissent to justify taking away from the Directors that which in the early part of the provision had been placed in their hands—namely, the distribution of the compensation, and submitting that distribution to the Court and not to the Directors. What the Act did in this provision was to put a double restriction on those who desired that the scheme should be submitted to the Court. First, they must obtain the dissent of the majority of the shareholders of the class to which they belonged; and, secondly, that dissent must be ascertained at a meeting. If he were to take the opposite view, it would be possible for proprietors holding a very small proportion of the shares to appear at the meeting, and, being a majority in value at that meeting, override the whole of the class who might approve of the scheme. The Legislature probably had in view the difficulty of getting shareholders to attend a meeting, especially when they approved of a scheme, and stayed away because they believed that in their absence the scheme would go through, and that the views of a few dissentients would not prevail. This seemed to be the natural meaning of the schedule. The conclusion he came to was that it was necessary to obtain at a meeting a resolution passed by the majority of the shareholders in value of the whole of the class in question. That being so, the motion failed, and must be dismissed.

## Question of Negligence in Regard to a Lucas Lamp.

In the King's Bench Division of the High Court of Justice last Tuesday, before the Lord Chief Justice and Justices Kennedy and Ridley, the case of *Glover v. Higgs* was heard. It was an appeal from a decision of Judge Emden, at the Lambeth County Court: and it involved a question of negligence in regard to a Lucas lamp, which had been hired by the defendants from the Wandsworth and Putney Gas Company. Mr. Pickford, K.C., said the defendants, Messrs. Higgs, building contractors, were appealing against a verdict and judgment for £75 in favour of the plaintiff, James Glover, one of their workmen, in an action under the Employers' Liability Act. They did so on the ground that there was no evidence of defect in the plant, or of negligence. They were building some premises for the London County Council at Battersea, and in order to provide light, they procured from the Gas Company a Lucas lamp of 700-candle power, which was suspended over the place where plaintiff was working. The entire control of the lamp was in the hands of the Gas Company, and strict injunctions were given to the defendants' workmen that they were not to interfere with it in any way except to turn it on and off. The lamp fell on to the plaintiff as he was working, and injured him. It was not suggested that there was anything wrong with the lamp, except that it was supposed that it became unscrewed through swaying about in the wind. That being so, he submitted that there was no evidence of defect in the plant, or of negligence on the part of the defendants or their servants; and as they had contracted with the Gas Company to look after the lamp, they were not liable under the Act. Mr. Craig Henderson, for the plaintiff, said it was admitted that there was vibration; and the Jury evidently came to the conclusion that defendants were negligent in not suspending the lamp more securely. They could not be allowed to escape liability by sub-contracting with the Gas Company. The foreman whose duty it was to supervise the plant admitted that he did nothing to see that the lamp was safely suspended. Mr. Pickford submitted that it was no part of the duty of the foreman to supervise a lamp put up by a competent contractor. That was left to the Gas Company. All the foreman said was that, if he had known the lamp was likely to become unscrewed, he would have looked to the coupling. Even when the lamp went out, the Gas Company were sent for to light it. The Lord Chief Justice said the only point was whether there was evidence of want of supervision. After further argument, his Lordship said they could not enter judgment for the defendants, and they were not satisfied that there had been a full and proper direction by the County Court Judge to the Jury as to the duty of the defendants in regard to supervision. The case must therefore go back for a new trial—the costs to abide the event. Justices Kennedy and Ridley concurred. Leave was given to the defendants to appeal further.

## Damage Caused to a Main by Felling a Tree.

At the Paignton County Court last Tuesday, the Dartmouth Gas Company brought an action against Richard Tucker for £8 19s. 9d. for loss of gas caused by damage to their gas-main, and for repairs, resulting from his alleged want of care. Mr. Eastley, for the plaintiffs, said Tucker contracted to cut down for the sum of £2 a tree standing on a boundary fence by a public road; and he was to have the tree. It fell across the road, and broke one of the Company's mains. Mr. P. Hockin, who represented the defendant, said his client denied liability, on the ground that he exercised due and proper care in felling the tree, and that the damage was accidental. A constable stationed at Dartmouth gave evidence as to the damage caused to the main, and the consequent escape of gas. In cross-examination, he said defendant told him that the tree must have fallen on a stone, which must have been forced into the road and caused the damage to the main. Mr. Tall, the Company's Manager, gave evidence as to the extent of the loss of gas. He admitted, in cross-examination, that the main was probably not more than 11 or 12 inches below the surface of the road, and that if he were relaying it he should put it at a depth of 2 feet or 2 ft. 6 in. Mr. A. Smith, the Borough Surveyor, said he gave the defendant permission to fell the tree into the road, and he considered the work had been carried out by him and his men with reasonable care. The broken main was an old one; and as it was only 10¼ inches below the surface of the road, it would require but a moderate blow to break it. In his opinion, the tree was felled in a skilful manner. The Judge held that as the tree was felled into the road with the leave and permission of the Highway Authority, Tucker could not be held responsible for the damage. He therefore non-suited the plaintiffs.

## Charge of Stealing Water.

At Ormskirk, on the 4th inst., Peter German, of Manchester, and Charles Taylor, of Levenshulme, drivers in the employ of the Hercules Motor Waggon Company, were summoned for having, on Aug. 3, at Lathom, stolen water from the Lathom and Burscough Urban District Council's main; and also for having wasted water. The defendants pleaded guilty to stealing the water, but not to wasting it. Mr. R. R. Glover, who prosecuted, said this was a new form of highway robbery, and was the outcome of modern methods of travelling. These men were each in charge of a steam-waggon travelling from Southport to Manchester; and at Westhead they put a stand-pipe they carried with them to one of the hydrants and took about 500 gallons of water. They left the water running for about three hours. Defendants said their tanks would only hold about 80 gallons. The Bench imposed a fine of 10s. and costs in each case and allowed two guineas costs beyond the Court costs.

**Cheaper Gas for Slough.**—The report which was adopted at the meeting of the Slough Gas Company last week, stated that the business during the past six months had been very satisfactory; and that the Directors had decided to reduce the price of gas by 2d. per 1000 cubic feet as from Michaelmas. The balance-sheet showed a profit of £1840 for the half year; and the usual dividends were declared.

# MISCELLANEOUS NEWS.

## IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Ordinary General Meeting of the Proprietors was held last Tuesday at the Cannon Street Hotel, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. R. W. Wilson) read the notice convening the meeting; and subsequently the Directors' report, as follows:—

The present half-yearly ordinary general meeting of proprietors has been convened, in conformity with the Association's Acts of Parliament, for the purpose of receiving a report from the Directors upon the affairs of the Company, and of declaring a dividend for the half year ended the 30th of June last.

The following summary shows the results of the Association's operations during the half year under review: The quantity of gas made during that period was 4497 million cubic feet. The quantity made in the corresponding half year of 1903 was 4170 million cubic feet—an increase of 327 millions, or at the rate of 7·84 per cent. The total number of lights on June 30 last was 3,079,891; at the close of the corresponding half year it was 2,829,749—an increase of 250,142; or at the rate of 8·84 per cent. The number of consumers on the books at the close of the half year was 283,858—an increase in the twelve months of 28,779, or at the rate of 11·28 per cent. The total mileage of mains in use on the 30th of June last was 2001 miles; on the 1st of January last, it was 1968 miles—showing an increase in the half year of 33 miles.

The sale of gas by the Association during the half year shows the satisfactory increase of nearly 8 per cent. upon the figures of the corresponding half year, and the receipts for gas also exhibit improvement.

The gross cost of coal showed a further decrease of 6·93d. per ton on the figures of the corresponding half year; while the values of coke, tar, and ammoniacal liquor were all higher, with the result that the net cost of coal was less than in the first half year of 1903 by 10·2d. per ton.

As a consequence of these improved results, the profit for the half year shows an advance upon that of the corresponding period.

The plant and mains at all the stations were maintained in a due state of efficiency.

At Antwerp, the erection of a third section of carburetted water-gas plant, having a daily capacity of one million cubic feet, was commenced.

At Berlin, a beginning was made with the erection of the second gasholder on the Mariendorf works. This holder—which is 239 feet in diameter, and has three lifts, each 41½ feet in height, with a total capacity of 5,300,000 cubic feet—will, when completed, be the largest gasholder hitherto erected on the Continent.

Owing to the increasing demands of the consumption in Berlin and in the suburbs, it was found necessary to augment the producing capacity of the works; but, as experiments are being made with a new system of vertical retorts, the Directors decided to postpone the erection of a new retort-house at Mariendorf, and to put up there in the meantime, in order to meet the requirements of the coming winter, a water-gas plant on the Dellwik-Lewes system. This plant, of a daily producing capacity of 1 million cubic feet, was commenced, completed, and put into action in the course of the half year under review.

Progress has been made with the cutting of the Teltow canal, which passes through the Mariendorf works; and a beginning was made with the construction, on the works, of the dock for the reception of coal barges.

At Brussels, the erection, on the Forest works, of new washers for ammonia and naphthalene was commenced; and the installation of coke conveyors and breakers, &c., at Koekelberg, begun in the summer of 1903, was completed.

The remodelling of the Vauban works at Lille, which, it will be remembered, has for its object the concentration at this works of the entire gas production at Lille, and the consequent closing of the St. André works, was proceeded with, and a commencement was made with the construction of the new retort-benches there.

In connection with this work, it may be of interest to state that the Directors have decided to fit up the new retort-house with electrically driven coal and coke handling plant, and with De Brouwer electrical retort charging and discharging machines.

An exclusive contract for the supply of gas has been concluded with the Commune of Watermael-Boitsfort—a suburb of Brussels—for a term of 32 years—*i.e.*, until 1936.

At Hanover, the Directors have secured a 71 years' contract, until 1975, for the supply of gas to the suburban commune of Grasdorf. This contract is an exclusive one for 46 years—*i.e.*, until 1950—after which it is subject, during the remainder of the concession, to competition.

The suburban commune of Oberdorf, near Komotau, one of the smaller stations in Bohemia, has concluded an exclusive contract with the Association for the supply of gas for 36 years—*i.e.*, until 1940.

At Vienna, a contract has been secured with the suburban commune of Hadersdorf-Weidlingau until the end of 1911, when the gas supply here, as also in the other outer districts on the western side of the Danube, will be taken over by the Corporation of Vienna.

The liquidation of the Association's assets at Haarlem was completed, except in regard to some land on the Leidsche Vaart, which the Directors have decided to retain for the present, in view of a probable rise in the value of land in this part of the town.

Advantage was taken of acceptable offers received, to dispose of further plots of land at Vienna.

In conclusion, the Directors desire to draw the attention of the proprietors to the accounts for the half year ended the 30th of June last. These have been duly audited; and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme, showing the profit of the Association for the half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 5 per cent., for the half year ended the 30th of June last, payable, free of income-tax, on and after Tuesday, the 8th inst.

The CHAIRMAN said the proprietors would perhaps have noticed that two of the Directors were absent on this occasion. They were Mr. Newton and Mr. Corbet Woodall. Mr. Newton, he regretted to say, had been obliged to go to the Mediterranean for the sake of his health; and Mr. Corbet Woodall had been called to South Africa on very urgent private business. Both gentlemen had asked him to tender their apologies for their absence from the meeting.

### PROSPERITY AND COMPARISONS.

It was now his pleasurable duty to move—"That the report of the Directors on the affairs of the Association, which has been read, be received, adopted, and entered upon the minutes." And, in doing this, he should like to make a few comments upon what the proprietors had heard read, because the half year had been in many respects a remarkable one in the business of the Association. The increase in the quantity of gas made and sent out was equal to, as nearly as possible, 8 per cent.; and this percentage had been exceeded only once during the past ten years. Of course, 8 per cent. on their business was a very large item; and it pointed to the fact that their business was not only extending, but that the prosperity on the Continent was very great. There was no question about that, especially in regard to Germany. Some of the Directors had only lately returned—in fact, only at the end of the previous week—from that country. Wherever they went they found no complaints of machines lying idle and works going short time; but everywhere—excepting the pig iron and silk industries—they found things in the most prosperous condition. The depression of which complaint was made two years ago in Germany had passed completely away. This was one of the reasons why they had secured such a large percentage increase in consumption in the past half year. No one knew better than those gentlemen who were interested in gas undertakings, that the gas industry was the very first of all industries to feel the pulse of depression or prosperity. Then, again, he wished to draw attention to the increase in the number of consumers. During the half year, the increase had been 14,404; or, in the whole year, the enormous increase of 28,779. For the interest of those proprietors who lived in London he should like to make a little comparison of these figures with those of the great London Companies, whose figures he had taken from "Field's Analysis" and so he presumed they were correct. In the year 1901, the South Metropolitan Gas Company had 16,187 new consumers; and the Imperial Continental Gas Association, 17,338. In 1902, the South Metropolitan had 18,379 new consumers; and the Association, 18,762. In 1903, the Gaslight and Coke Company had 23,800 new consumers, the South Metropolitan 18,500, and the Association 28,800. The general averages for the three years to which he had alluded were: Gaslight and Coke Company, 12,500; South Metropolitan Gas Company, 17,700; and the Imperial Continental Gas Association 21,600. He must, however, tell the proprietors that the increase in number was, of course, chiefly in the class of small consumers, who—considered from the points of view of volume of consumption, of capital outlay required to connect them with the mains, and of cost of maintenance—did not yield such profitable results as when they coupled up large consumers to the mains. Nevertheless, this continual steady increase was an indication of the extended use of gas in all parts in which their business was established; and it was proof, he thought, that gas had little or nothing to fear from competitors. Now the 283,858 consumers that the Association had on their books required 349,000 meters, and the difference in the number of consumers and of meters was accounted for by the fact that they had two prices for gas in many of their towns. It was a system that he had urged some of the English companies to adopt, but without much success. They had one price for lighting, and a much reduced price for cooking and heating. He could assure the proprietors that this had been of the greatest benefit to the Company, both in the sale and the extended use of gas; and in their profits, they had derived great benefit from the system they had adopted. Then, of course, as the number of consumers had been increased, the mileage of mains had similarly increased, and now stood at 2001 miles, which was also more than ever before recorded, even when the Association had Amsterdam, the whole of Vienna, and Haarlem. The extension was still going on, because of the immense amount of work which had to be done in the suburbs of the large towns.

### INSPECTIONS OF WORKS.

Now he wished to speak of the visit which had been paid to the stations by some of the Directors. During the year, Mr. Corbet Woodall made several short visits, and during October Sir Charles Jessel, Colonel Le Roy Lewis, and himself (the Chairman) made a very extensive, and, he might say, a very exhausting tour among the stations—beginning at Antwerp, going on to Vienna, and back again to Berlin. They visited twelve towns; they inspected and reported upon 28 separate works, to say nothing about show-rooms, offices, and spare lands. It was a very good time of the year just previous to this meeting for the Directors to visit the stations, and for this reason: They were then able to see that the work which had been sanctioned and carried out during the slack months of the year—that was to say, during the summer time—had been properly and efficiently carried out. They were also able, by personal inspection, to see that the works were in a proper state, and well equipped with stocks of coal and so on, to meet the great demands coming upon them during the next four or five months. Therefore, it was with the greatest pleasure he had to tell the proprietors that the Directors visited all these towns and works, and found everything in the most perfect order. The work that had been done at them during the summer had been thoroughly well carried out; and they were all in a perfect state of efficiency to meet the demands which the consumers and the municipalities would make upon them.

### THE COMPLETE EXTINCTION OF FLAT-FLAME BURNERS.

He thought that one of the great object-lessons which the Directors learnt when they visited the stations of the Association was the complete extinction of the old-fashioned flat-flame and other burners. They saw nothing but the incandescent burner and mantle. He (the Chairman) searched Berlin through to find flat flame burners. Every little side street, every *cul de sac*, every lane in the suburbs, even the basement shops in the poorest quarters of Berlin—all were brilliantly lighted by the incandescent gas-burner. He did eventually find one flat-flame burner, but he hardly liked to tell the proprietors where it

was. It was in the foundry attached to the meter factory of the Imperial Continental Gas Association. (Laughter.)

THE VERTICAL RETORT EXPERIMENT.

A year ago he mentioned that their Engineers in Berlin, in conjunc- with some of the most celebrated German gas engineers, were making experiments with an entirely new system of retorts—called vertical retorts; and he (the Chairman) then told the proprietors that he hoped in a year's time to be able to give them some particulars of the experiments. They put in a setting of twelve vertical retorts at Mariendorf; and, though they worked well during the year, they were not yet what the Engineers considered perfect. They still believed that there was a great future for this system of carbonizing; and they had asked the Directors to allow them to make further experiments, in the hope that the system might be perfected. This was all he was able to tell the proprietors on the present occasion about the vertical retorts.

NEW CONCESSIONS.

In regard to new concessions, the report had mentioned one or two small ones. But they were what might be called rather unimportant concessions, though they fitted in well with the supply systems in the towns where they already had concessions. The Directors had, therefore, not much to chronicle in the way of new concessions. The truth was they had been so extraordinarily active in this direction during the past ten years that, unless they obtained altogether new towns to light, they had practically acquired all the concessions that were to be acquired in the vicinity of the great towns that they lighted.

THE FINANCIAL POSITION.

A few words now as to the financial position. The scheme for the division of the half-year's profit had been read; and this indicated the two sources from which the Association obtained their profit. There was the net profit from the business abroad; and there was the interest received from investments at home. A comparison with the corresponding period of 1903 showed that the increase in the profit owed nothing to dividend or interest on investments; and the increase was therefore entirely due to the gas business. It must be remembered, however, that the profits which had been made at the stations were subjected to a very heavy charge for depreciation and amortization, which must necessarily increase with the extension of the capital for plant. Speaking of investments led him to refer to the depreciation that had taken place in the value of the gilt-edged securities that the Association invested in some years ago. He thought he informed the shareholders three half years ago that the value of these securities had fallen very considerably, and that the Directors had deemed it prudent to write down the investments in British securities to a considerable extent. Since then, there had been a further fall in these investments; but the Directors had not thought it necessary to write them down any more, as they believed they now stood at a figure which, in normal times, represented their fair value, and that if at any time they required to sell any of the securities, either for the purchase of a concern or for the expenditure of capital for plant, the loss that was sustained on the sale must go against the half year in which they were sold. This, in the opinion of the Board, would be the fairest way of dealing with this matter. (Hear, hear.)

THE DEATH OF MR. EDWARD DRORY.

That was all he had to say with regard to the report and accounts. He had spoken of their prosperity and success; and he had now to refer to a very sad loss that had been sustained by the Association. It was a loss which would not affect the pockets of the proprietors; but it was a loss which was a serious one for the Association, and a very serious one for the Board. He alluded to the death of Mr. Edward Drory, their Senior Engineer at Berlin, which took place in the first week of September. A very truthful and sympathetic notice of Mr. Drory appeared in the "JOURNAL OF GAS LIGHTING" shortly after his death. Every single word that was then written by the Editor was perfectly true; and he (the Chairman) could add a great deal more to what was then written. Having known Mr. Drory personally ever since he (Mr. Palmer) became a Director, and knowing his value to the Association, there were no words which he could use from the chair which could give the proprietors any idea of what the loss of Mr. Edward Drory had been to them. Mr. Drory, who had served them for a period of 42 years, had given practically the whole of his life to the work of the Association. Ever since he was 18 years of age he worked for the Association—in fact, he worked himself out for the Association. There was no question about that, because, being a man of a highly-strung, nervous temperament, and being mentally extraordinarily active, he exhausted his strength in endeavouring to do the very best for the Association. His reputation as a Gas Engineer was almost as great here in England as upon the Continent, where he was certainly one of the leading members of his profession. His services were continually in request as a Consulting Engineer, in an honorary capacity, both to corporations who owned gas-works and to others. He it was who perfected the system of inclined retorts; he it was who worked heart and soul on vertical retorts. He (the Chairman) could only say further that the Association had lost a most devoted servant; and the Board a great personal friend. He need hardly say that the Board had made suitable provision for his widow. Mr. Drory's successor had already been appointed. Mr. E. Körting, who was now their Chief Engineer at Berlin, was a son of the Association's Senior Engineer at Hanover, and grandson of the Mr. Körting who formerly was also Chief Engineer at one of their works; so that here they had the third generation succeeding to the chief engineership of important works of the Association. Mr. Körting had been associated with Mr. Edward Drory for a considerable number of years. He had always been looked upon by the Board as one of their rising engineers; and they had full confidence in his ability to carry out the work at Berlin.

Mr. ARTHUR LUCAS seconded the motion, which, without discussion, was unanimously carried.

THE DIVIDEND.

On the motion of the CHAIRMAN, seconded by Mr. J. H. BIRCHENOUGH, a dividend of 5 per cent. for the half year on the £3,800,000 stock of the Association was declared, free of income-tax.

VOTES OF THANKS.

Colonel H. LE ROY-LEWIS moved a vote of thanks for the services rendered to the Association by their officers and staff, both on the Continent and in London. He said it gave him great pleasure to do this, as he had only just returned from a tour of inspection, during which he visited nearly all the stations on the Continent. There could be no doubt about it that the Association was admirably served by its Engineers, and by all in its employment. The efficiency of their Engineers was, he thought, sufficiently proved by merely glancing at the balance-sheet. He did not only wish to refer to the Continental Engineers, because in a large and varied undertaking of this description, in which many different nationalities, languages, and customs were involved, very important work rested on the London staff in codifying, and presenting in an intelligible form to the Board, the various reports received from abroad. This work was admirably performed under the guidance of their able Secretary.

Mr. C. PIGOU seconded the motion, which was cordially agreed to.

Mr. LEONARD WILKINSON remarked that, before separating, the proprietors ought very heartily to thank their Directors for the way in which they had managed the affairs of the Association during the past half year. He was sure he was voicing the sentiments of all the proprietors present when he said that they were grateful to the Directors for the extremely encouraging and flattering report which the Chairman had been able to present that day. They had expected a very good report, if the recent rise in the value of the stock, as shown in the Stock Exchange quotations, was any guide. No one, however, had been prepared for the 8 per cent. increase in the volume of the business done that they had heard of that day.

Mr. J. REESON, in seconding, observed that the proprietors were not only gratified with the prosperity of the Company, but they were also pleased to find that there was such a feeling of sympathy between the Board and the officers, as had been expressed not only by the Chairman but by the gentleman who moved the vote of thanks to the officers.

The motion was heartily passed.

The CHAIRMAN, in reply, said he thanked the proprietors for the vote accorded to himself and his colleagues. It was always a pleasure to work for the proprietors; and he hoped the Board would be able to put before them as favourable a report on the next occasion.

This concluded the proceedings.

## COLONIAL GAS ASSOCIATION, LIMITED.

The Annual General Meeting of the Association was held on Tuesday last, at the London Offices, Suffolk House, Laurence Pountney Hill, E.C., Mr. SAMUEL SPENCER in the chair.

The SECRETARY (Mr. Alfred J. Kingdon) having read the notice convening the meeting, the Directors' report and the accounts were taken as read, and also the Auditors' report.

The CHAIRMAN, in moving their adoption, said he had no doubt the shareholders had all read the Directors' report; and he hoped that they were, on the whole, fairly satisfied with the year's working. As stated, the increased consumption of gas had been 8¼ per cent., which the Directors were pleased to say was a better result than had been experienced for some time. They were hopeful that a much larger percentage would be realized in the coming year. The progress of the Association during the past year had not been so great as the Board had anticipated; but taking into consideration the state of trade in the Colony, the increased sale of gas, the results generally must, he thought, be regarded as moderately good. The Managing Director (the Hon. Mr. Swinburne) reported that the sales of gas and residuals had, with only one exception, increased at all the works. The stocks, it would be noticed, were smaller; and this arose chiefly from having less coal in stock. This, however, would be to the benefit of the Association during the current year, as the coal trade in Australia was not brisk; and they would be able to make, and in some cases had already made, very favourable contracts, which they expected would help them considerably in the next balance-sheet. The actual profit for the past year had been £6085, against £5665 for the previous year. The revenue from the sales of gas and residuals was £16,772, as compared with £15,661 in 1903. During the year, the number of consumers had increased by 173. The additional expenses had been somewhat heavy in the year; this having been due to extra cost of coal, more being used for the increased output of gas, and wages, and a much larger outlay on repairs and maintenance. The reports from Mr. Swinburne indicated that the shareholders could look forward to a steady and continued increase taking place in the consumption of gas during the current year. At one of the works, it was so large already that a new 40 feet gasholder and steel tank had been called for. This would necessitate an increase of capital. Besides this, the Board had last year been much in want of further working capital; and as they had seventeen 5 per cent. debentures of £100 each (the balance sanctioned some time ago, and making the total issue £25,000), the Directors were desirous of placing, and should be glad to receive applications from any shareholder for, the whole, or part, of these. It was hoped by the Directors that they would slightly increase the divided at this meeting; but it had been unanimously decided by the Board to pay the same rate of dividend this year as last, as it would place the Company in a sounder financial position. In doing this, it had enabled them to increase the writing off on depreciation, to increase the reserve fund, and to carry forward £812—this being some £250 more than the previous year. In conclusion, he said the prospects appeared much better than they had been for some years. It was

gratifying to the Directors to know that the shareholders shared this view, as it would be noted that the transfer fees only amounted to the small sum of £2 5s. for the year, showing clearly that the shares were closely held, and that it was expected better results would soon be received.

Mr. W. C. PARKINSON seconded the motion; and it was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. CHARLES HUNT, a dividend was declared at the rate of 6 per cent. (free of income-tax). This, remarked the Chairman, was at the same rate as last year; and, on the whole, he thought it must be considered satisfactory.

The CHAIRMAN next moved the re-election of the retiring Directors, Mr. Parkinson and Mr. Hunt. He observed that the former gentleman had been with them from the inception of the Association; and he seldom missed a meeting. As to Mr. Hunt, the Directors were gratified indeed that he was with them to give them the benefit of his advice.

Mr. A. GODWIN-HAMMACK seconded the motion, which was heartily agreed to.

On the proposition of Mr. J. D. HAYTON, seconded by Mr. R. H. DYER, the Auditors (Messrs. Wood, Drew, and Co.) were re-appointed.

Mr. DYER moved a vote of thanks to the Directors and staff in Australia. He remarked that the shareholders could not find fault with the working, considering the state of affairs. They would, of course, be glad to see the capital lower, or more in proportion with the business done; but he knew that they would not see this until more business was obtained.

Mr. F. H. H. ASHDOWN seconded the motion, which was cordially agreed to.

Proposed by Mr. HAYTON, seconded by Mr. DYER, the services of the Chairman and Directors were also duly acknowledged.

With the Chairman's acknowledgment, the proceedings ended.

## SOUTHAMPTON GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday, under the presidency of Captain A. CORSE-SCOTT.

The CHAIRMAN, in moving the adoption of the report and accounts (which were noticed in last week's "JOURNAL"), referred to the satisfactory nature of the figures. He said that the amount of profit available, £21,116—being £9158 beyond the sum required for the payment of the maximum dividend—had enabled the Directors to augment the reserve fund by another £5000, making the addition to the fund £10,000 during the past year. The quantity of gas sold during the first half of this year was 305 million cubic feet; being an increase of 19 millions over the corresponding period of 1903. The receipts from coke, tar, and sulphate of ammonia, which of late years had been more or less unsatisfactory, showed the considerable increase of £1093. The total number of consumers supplied with gas by the Company now amounted to 19,000, of which nearly 2000 had been added to the list during the past year. This gratifying extension of the business had necessitated considerable capital outlay for new mains, meters, cooking stoves, and fittings, to meet which the Directors offered for tender £5000 of 5 per cent. ordinary stock at £111 per cent. (an increase of £1 per cent.), and £5000 of 4 per cent. debenture stock at £110 per cent. This issue had resulted in applications having been received for £10,580 worth of stock. It appeared to him that the only unsatisfactory point in the position of the Company consisted in the very heavy sums which had to be paid for rates and taxes. These together amounted during the past twelve months to £5172, which represented a payment on account of local rates of 1½d. for every 1000 cubic feet of gas sold, and, if taxes were included, of 2d. per 1000 cubic feet. Notwithstanding this heavy charge upon the Company and the consumers, the Southampton Guardians contemplated an increase in the rating of the undertaking. The Directors wished to express the hope that an amicable agreement might be arrived at, as they were desirous, in the interests both of the ratepayers and the consumers, of avoiding if possible the enormous expense which would be involved in the litigation consequent upon an appeal. On former occasions excessive assessments had compelled recourse to litigation, the costs of which had amounted in more than one instance to over £4000. The annexation of Shirley, Freemantle, Millbrook, and Bitterne Park to the borough of Southampton resulted in two prices for gas existing within the boundaries of the enlarged borough. It had been the wish of the Board to equalize the charge throughout the whole borough; and provision was made for this being done within ten years of the passing of the Company's Act of 1898. The present prosperity of the Company having, however, made it possible to meet the great cost involved in this equalization of price, the Directors had now determined to make a further reduction of 3d. per 1000 cubic feet to ordinary consumers in the added areas and Portswood from Jan. 1 next. It was a matter of great satisfaction to accomplish this equalization of price four years before the period stipulated in the Act. It would benefit nearly 3000 consumers to the extent eventually of £9500. This being the fortieth occasion upon which it had been his privilege to meet the proprietors as a Director at the half-yearly meetings of the Company, a few figures showing the progress of the undertaking during that period would be of interest. The capital on December, 1884, was £227,599, and in June, 1904, £674,817; being an increase in twenty years of £447,218. The dividends paid for the year ended December, 1884, represented £12,937, and for the year ended June, 1904, £23,717; showing an increase of £10,780. The gas sold in the year ended December, 1884, was 224,061,000 cubic feet, and in the year ended June, 1904, 614,381,000 feet; an increase of 390,320,000 feet. The number of consumers for the year ended December, 1884, was 4970, and for the year ended June, 1904, 19,000; showing an increase of 14,030.

The report was adopted, the remuneration of the Directors was increased from £1200 to £1500, and the Chairman, Directors, Secretary (Mr. E. Eady), Manager (Mr. S. W. Durkin), and staff were thanked for their services.

## DISCOUNTS AND INSURANCE AT BELFAST.

In moving the adoption of the minutes of the Gas and Electric Committee at the quarterly meeting of the Council of the County Borough of Belfast last Tuesday, Mr. J. A. Doran said that, no doubt owing to the very exceptionally fine weather experienced during the past month, the demand for gas had been only moderate; the output showing a decrease of about 1 per cent. The question of continuing the insurance of the stove warehouse, Queen Street offices and workshops, and other outside premises had been on several occasions before the Committee. It would be remembered that some years ago the insurance of the gas-works was abandoned owing to the large increase in the rate demanded by the Insurance Companies; and it was decided to write off a portion of the profits to an insurance fund. This fund now stood at £17,000; and the Committee considered it desirable to adopt the same rule in connection with the outside premises as had been applied to the main works. As the premiums on the policies were now falling due, they proposed, with the approval of the Council, to allow them to lapse. Application having been made by the Cemetery and Parks Committee for a grant of £1000 to assist them in the completion of the Victoria Park, the Committee resolved to recommend that the request should be granted. The question of a further increase in the rate of discount granted to the smaller consumers had also been considered; and it was decided to recommend that the allowance would be 10 per cent. (instead of 5 per cent.) on all accounts under 200,000 cubic feet per quarter, with the usual condition of prompt payment. This would mean a reduction of about £5000 in the annual receipts, and would make the maximum price of gas only fractionally over 2s. per 1000 cubic feet. The minutes were adopted.

## INQUIRY AS TO THE PICKERING VALVE PATENT.

On the 26th ult., the Comptroller-General of Patents heard the opposition of Mr. R. J. Milbourne, of Messrs. C. & W. Walker, Limited, against the application for patent No. 9244 of 1903 by Mr. W. S. Pickering, of Messrs. Willey and Co., Limited, of Exeter, in respect to an improved valve arrangement for gas-purifiers. The applicant was represented by Mr. Edward Evans, of Messrs. Edward Evans and Co., Chartered Patent Agents, while Mr. J. W. Gordon was Counsel for Mr. Milbourne. In the result, the opposition was unsuccessful; and the Comptroller decided to seal a patent to Mr. Pickering. The invention covered related to an external arrangement of valves for gas-purifiers on the side, constituted of associated inlet and outlet valves for each of the purifier compartments, with such external connections as to enable any one of the compartments to be put out of the circuit of the gas in rotation, so as to permit of the purifying material being successively renewed. The opposition was based upon the prior patent No. 11,356 of 1901, according to which an arrangement of internal valves is provided in communication with the inlet and outlet mains, which run beneath the purifier itself. Mr. Evans was able to show that all the features common to Mr. Milbourne's and to Mr. Pickering's constructions were notoriously old, and that the claims of the former were solely confined to an internal arrangement of valves on the side of the purifier, and that he was not entitled to, nor did he claim, the external arrangement of the valves which it was the object of Mr. Pickering to provide.

## TEIGNMOUTH GAS AND WATER SUPPLY.

### Local Government Board Inquiry.

Last Tuesday an inquiry was held at Teignmouth, by Mr. E. P. BURD, one of the Inspectors of the Local Government Board, respecting an application by the Urban District Council for a Provisional Order to amend the Act under which the town is supplied with water, to incorporate certain provisions of the Gas-Works and Water-Works Clauses Acts, and to confer upon the Council further powers in connection with the supply of gas.

Mr. A. P. DELL, the Clerk to the Council, said the gas-works had been established many years under an Act of 1836, and for some time past had, no doubt, been getting out of repair. Power was obtained to borrow £2900 to improve them; and this money had been spent—the improvement including new retorts. In consequence of a request for electric light, the Council applied for a Provisional Order four or five years ago; but this was done somewhat in a hurry, and the Order had never been worked, and had been transferred to a private company. In order to make up any loss which might arise through the competition of the electric light, the Council wished to put in slot gas-meters; but they had no power to do this. At present only 562 houses were supplied with gas out of a total of more than 2000. With reference to the water supply, the Council had entered into an agreement with the Paignton District Council for a supply in bulk when their works were finished. For this they were to pay 5¾d. per 1000 gallons, with power to have a readjustment of the price by arbitration after a certain number of years. Sanction for a loan for laying the water-mains was about to be applied for; and in connection with this, it was felt that the opportunity should be taken to obtain powers to make bye-laws as to the waste of water, &c., and to fix the charges for the supply of water to gardens and baths. It was proposed to charge 10s. a year for baths in houses rated at £20 and upwards, and 6s. a year for those rated at less than this amount. The charges for water for shipping would also be revised.

Mr. *J. A. Gray*, the Manager of the gas-works, said that with the present producing plant they could make between 46 and 50 million cubic feet of gas per annum. Last year the actual output was rather over 27½ millions, which was an increase on the previous year. The price was 4s. per 1000 cubic feet. He estimated the average cost of the slot-meter installations at £5 each; and if this work were taken in

hand, he saw no reason why they should not largely extend the sale of gas by supplying the smaller houses. The leakage last year was 10 per cent.; but this included condensation in the mains.

The INSPECTOR remarked that, allowing for condensation, 10 per cent. was a high rate of leakage.

*Witness* said there were many other gas undertakings in which the leakage was more than 10 per cent.; but he should like to see it reduced to 5 per cent. in Teignmouth.

The INSPECTOR said they might expect to realize it if the mains were in proper condition. He also thought they would have a better chance of extending the gas supply if the price was lowered.

Mr. *C. E. Gettings*, the Surveyor, gave evidence as to the water supply. He said that, in order to prevent waste, it was proposed to have a uniform two-gallons flushing-tank for water-closets. With regard to the existing tanks, it would pay the Counsel to meet the owners in the cost of the alterations. The consumption of water in Teignmouth was 15 or 16 gallons per head.

Dr. W. C. LAKE objected to a charge being made for baths, and said that in Teignmouth water for this purpose had always been considered part of the domestic supply; and it was an anachronism to impose a charge now that baths were becoming more appreciated.

Mr. W. M. BIRD, the Chairman of the District Council, said the charges would only apply to fixed baths in connection with which there was a large use of water.

This concluded the inquiry.

## DEVONPORT WATER-WORKS AWARD.

Mr. A. J. Ram, K.C., the Umpire in the arbitration proceedings between the Devonport Water Company and the Corporation, has made his award. The object of the arbitration (the proceedings in which have been reported in the "JOURNAL") was to determine the price to be paid by the Corporation for the undertaking of the Company. The award provides that, if the Admiralty are restricted in the user of the water, the price to be paid for the concern is to be £268,123; and if they are not restricted, the figure will be £209,920. The question of the Admiralty's rights will be determined in the Law Courts. It is contended by the Admiralty that, under the Act of Parliament constituting the Company, they have a right to the practically unrestricted user in all the Dockyard establishments at Devonport of as much water as will pass through a 6-inch pipe; and that for this they have to pay only some £400 or £500 per annum. On the other hand, the Company contend that the Admiralty are only entitled to a supply under these conditions for the old Dockyard, which forms but a very small area in comparison with the present large and growing establishment. As a matter of fact, the Admiralty were paying, in addition to the sum stipulated in the Company's Act, about £2000 per annum for water. There are, however, new restrictive conditions in the Corporation Water Act which will have to be interpreted by the Courts; and it has already been stated that, as the amount at stake is so large, the matter is likely to be carried to the House of Lords.

## THE KINGSBRIDGE WATER-POISONING SCARE.

The question of the recent discovery of traces of carbolic acid and naphthalene in the new water supply came before the Kingsbridge District Council last Wednesday, and led to an acrimonious discussion. A report by the Medical Officer (Dr. Webb), with reference to the discovery of "a quantity of mineral *débris*" in one of the new reservoirs and its analysis, was read. Reports were also presented by the Surveyor (Mr. Lane) and the Engineer of the new water scheme (Mr. Latham) as to the completion of the new works. Both reports showed that the works, mains, and fittings had been tested with the most satisfactory results; the operation having been carried out in the most approved manner and with the best material. The Surveyor's report referred to his discovery of a suspicious deposit on the floor of one of the reservoirs, and set forth that, upon the Medical Officer's report as to its injurious character, he had the reservoir thoroughly scrubbed before it was used. It was proposed by the Chairman (Mr. J. S. Hurrell) that the subject should be discussed in Committee; but this was opposed by other members, who said that the affair had already gained wide publicity, and as opponents of the scheme had been charged with poisoning the water, it was desirable to have it publicly dealt with. The motion found only two supporters. Dr. Elliot said that though opponents of the scheme were alleged to have had something to do with this supposed diabolical outrage, there was no evidence that there had been any. Though the Medical Officer and Surveyor found traces of carbolic acid and naphthalene, there was no evidence of how these matters got into the reservoir; and the Surveyor, in suggesting that the stuff was put down the ventilator, simply begged the whole question. His own opinion was that it was derived from coal tar. A large quantity of coke was used in making the reservoir, and it was of two kinds—one guaranteed to be free from carbolic acid, and the other not so guaranteed. His idea was that what was found in reality came from the coke breeze. The Surveyor had discovered a mare's-nest. If he knew that coke breeze was used in making concrete for the construction of the reservoir, he ought to have acted with more wisdom. Mr. Davis also complained that the officials did not take steps to have the Council called together when the discovery was made. His opinion was that the *débris* and liquid found came from the materials used in constructing the reservoir and laying the pipes. The Medical Officer said it was an absolute want of common sense to say that the stuff was composed of some of the constituents of the material used in making the reservoir. The liquid was not the small quantity some of the members imagined; it was much greater. He did not submit it to the Council, because he did not think they were competent to pass an opinion upon it. The Chairman said he saw the liquid, and it was the colour of bran. In his opinion, there was evidence that this diabolical thing had been done. After some further discussion, the matter was allowed to drop.

## METROPOLITAN WATER ARBITRATION.

### Fifty-Fifth Day—Tuesday, Nov. 1.

(*Before the Right Hon. Sir* EDWARD FRY, *Sir* HUGH OWEN, G.C.B., *and Sir* JOHN WOLFE-BARRY, K.C.B.)

### The New River Company's Case Resumed.

To-day the arbitration proceedings in regard to the claim of the New River Company against the Metropolitan Water Board for compensation in respect of the acquisition of their undertaking under the Metropolis Water Act, 1902, was resumed at the Institution of Mechanical Engineers, Westminster.

Mr. BALFOUR BROWNE, K.C., Mr. C. A. CRIPPS, K.C., Mr. CLAUDE BAGGALLAY, K.C., and Mr. F. W. PEMBER appeared for the claimants; and the Board were represented by Mr. F. MOULTON, K.C., the Hon. J. D. FITZGERALD, K.C., Mr. FREEMAN, K.C., Mr. HONORATUS LLOYD, K.C., and Mr. A. B. SHAW.

At the outset of the proceedings, the Court, after consideration, refused an application made by Mr. CYRIL DODD, K.C., on behalf of the Governors of Queen Anne's Bounty, shareholders in the Company, for permission to be represented at the inquiry.

Mr. MOULTON stated that since the Court last sat the valuers had met on the subject of the Clerkenwell Estate and the excepted lands, and had valued the undertaking. They had agreed upon two figures. The Water Board insisted that by valuing the undertaking it meant valuing the Clerkenwell Estate and the excepted lands, taking into consideration their future as well as their present rents; and the valuers had agreed upon a figure. But the representatives of the Company insisted that another figure also should be agreed upon—viz., what was the capitalized value of the rents of these properties at the moment. Counsel proceeded to read letters of the valuers—Mr. Douglas Young for the Water Board, and Mr. James Green for the Company—and said the parties were agreed as to the schedule of excepted lands and the Clerkenwell lands.

Mr. BALFOUR BROWNE said the question as to what compensation had to be paid to the Company had been put by both sides upon the basis of the income derived by them; and this income was now limited, by the decision of the Arbitrators and that of the House of Lords, to 10 per cent. The question was: What was the value of the Clerkenwell Estate? At the present time there was no doubt they were deriving a certain income from the estate—he believed between £5000 and £6000 a year. What they would derive in future was entirely problematical—it depended on circumstances which nobody could now foresee; and what the other side wanted to do was to take this figure of a problematic future, and deduct it somehow from the present value of the undertaking. The reason they had asked for a separate valuation was that they admitted that the present value of the estate was somehow to be put against the present value of the whole undertaking, because they were to keep the value of the estate, and he could not ask for it twice over. But when they came to ask them to-day to cut down their income by something which might happen at the end of 29 years, they protested against it; and this was the second valuation difficulty. Many of the leases did not fall in for 29 years—he thought 1932 was the year; and the Court were asked to cut down either 10 per cent. or the capital sum represented by it, because the owners of the property in 1932 might possibly get a large sum in hand for that.

Sir E. FRY: You may sell all this land and get in the whole present market value, if you choose, at once.

Mr. BALFOUR BROWNE: Even that is entirely speculative.

Sir E. FRY: Everything is speculative; but you have agreed that is the market value.

Mr. BALFOUR BROWNE: We have agreed that is the discounted market value. I should have thought that the right thing to do was to take the present value and leave all these problematical values on one side, because it may go up or it may go down. These surveyors reported that it would go up.

Sir E. FRY: Do you wish us to state the question in the form of a special case that you may take it to the Court of Appeal?

Mr. BALFOUR BROWNE: No; we do not.

After some remarks by Mr. CRIPPS and short evidence by Mr. *Green*, the valuer,

Sir E. FRY intimated that the Court would dispose of the point in their award.

On the question of the past dividends,

Mr. BALFOUR BROWNE said the maximum dividend of the new shares limited to 10 per cent. could have been £1,483,803. As a fact they had paid on these new shares £1,772,405, or an over-payment of £288,602. Of course, this was done in the belief that they could pay more than 10 per cent. The holders of new shares had received too much, and he supposed they got it from 1866. But it could not be got back from them. The holders of the King's and adventurers' shares had still an absolute right to their 10 per cent.; and the fact that the Directors in the past had paid away some £288,000 to people who were not entitled to it could not disentitle them to the 10 per cent. now. In fact, to make up this to them the Company had to pay about £288,000. He asserted that they were still owing, whenever they had the money—and they had it now—to the holders of King's and adventurers' shares, a deficiency of £284,435 on their 10 per cent.; and they had a right to receive it.

Mr. MOULTON submitted that, under the circumstances of the present inquiry, they had not to consider whether the Company had overpaid on the adventurers' shares and underpaid on the King's or *vice versâ*, but only the amount of profits distributed by way of dividend. Of course, it was perfectly obvious that nobody could have interfered except the shareholders themselves. The only thing that interested the public was the total amount divided. The Company had no back-dividends to pay—they had paid them all; and therefore they were only entitled to a valuation of the 10 per cent.

After further arguments,

Sir E. FRY said the Court were clear that the 10 per cent. limit was not to be regarded by them as applied to the several shares separately, but to the undertaking as a whole. It might affect the rights of the shareholders between themselves when they came to the division of the surplus; but as between them and the public, 10 per cent. was the limit of the undertaking, and not of the several shares.

The questions of the costs of the appeals in the House of Lords and of the arbitration were next brought forward.

Mr. *J. G. Griffiths*, accountant, was then examined by Mr. MOULTON as to the comparative value of water stock and London County Council stock.

Mr. *H. E. Haward*, the Comptroller of the London County Council, and Sir *John Hollams* also gave evidence respecting the present value of Metropolitan water stock.

Mr. MOULTON summed up the case for the Water Board, expressing his belief that the 10 per cent. dividend of the Company would be maintained. If the new water stock was to be as well-secured an income as that of the Company and yield the same income, that would be the proper basis of the award which the Commission should make.

### Fifty-Sixth Day—Thursday, Nov. 3.

At the opening of the proceedings to-day, the announcement was made by Counsel that certain portions of the Clerkenwell Estate would be taken by the Water Board, and others retained by the Company.

Mr. MOULTON then continued his address on behalf of the Board. He commented upon the point of their giving an equivalent income to the Company in water stock subject to deductions. He contended that this stock was a higher security than the present income of the Company, which showed a net profit of about £202,000 available for distribution. This practically amounted to 10 per cent. dividend with a margin, but it could not possibly compare with the better security of the Board, backed by all the rates of Greater London. It was also to be remembered by the sterilization clauses the Legislature had enacted that the profits derived from the reservoirs constructed at a late period in the history of the Company should not be included in the income; and therefore this amount should be deducted from the claim. It was quite unreasonable for the Company to claim not only an equivalent in water stock but one-sixth more.

Mr. BALFOUR BROWNE, in reply, said it had been proposed by the other side that they were not to be remunerated in cash on capital value, but were to receive income for income. Their valuation was one of income for income; and it had been contended that if the shareholders received the same income they were compensated. They were not, because if he were a shareholder, he would want to get out of the Company and sell his stock; and he must have the same capital sum. This was compensation. He must have sufficient cash in money to buy not £6,733,000, but enough to buy upon the £91 6s. 6d. basis, which was the amount the Board had agreed with other Companies. He must have £7,372,800 at £91 6s. 6d., the amount he could have got if this matter had been settled in July.

The PRESIDENT: Yes; but there was the appeal in the House of Lords.

Mr. BALFOUR BROWNE said he ought not to be punished because he went to the House of Lords. As a matter of fact, it was the other side who went to the House. If they had never taken him there, he would have had the sum named. Even if he was wrong with regard to the £91, if it was at £93, he would have to take £7,240,000 instead of the £7,372,000 upon the £91 6s. 6d. basis; and this was what he thought he was entitled to. They must give him not only security for the income but for the capital; and the only way to do that was to value them in cash first of all. If they took the value in cash, there was another step—to turn it into water stock. As to the security of 10 per cent., his learned friend admitted that they had an income of £201,000; but that was leaving out their power to charge £50,000 in addition. It they were limited to 10 per cent., everything beyond it did not belong to them, but to the consumers; and it seemed to him ridiculous that the consumers in their district would allow them to give a bonus of £50,000 a year out of their pockets to people in the City of London. If they were really limited, that £50,000 belonged to the consumers, and they would be bound to charge it. They must charge all their consumers upon the same basis; and if they did this, they would get £50,000 from the City. Therefore he asserted that the security was absolutely undoubted. They had a very large surplus beyond the £201,000; and therefore it deserved the highest multiplier they could apply to it. As to the Clerkenwell Estate, he admitted that somehow there ought to be a deduction, because they were going to keep the estate; but he would like to say, on the question of security, that the estate was good security for the 10 per cent. At the present time they were only getting a sum which represented an enormous increase in the future. Their income was better secured than that of any other Water Company in London. It was not only well secured, but there was a margin of £100,000. The income which the tribunal had to deal with was actually £201,083; and this, multiplied by 36·36, gave £7,312,109. A corresponding amount of water stock at £91 6s. 6d. was £8,006,700. Out of this he had still to take the value of the Clerkenwell Estate. To deduct for it £576,000 was treating it as being as valuable as the 10 per cent. income. If he were right that the income from the estate would be £17,000 a quarter, this, multiplied by 16 years' purchase, came to about £200,000, and not £500,000, as the amount of the deduction. This was how he asked the tribunal to value the income, and to award the Company £8,006,700, less the value of the Clerkenwell Estate.

The PRESIDENT intimated that the Arbitrators would prepare a form of award, and submit it to Counsel for their consideration. It would not be necessary for the Court to sit in public; but he and Sir Hugh Owen would be in attendance at ten o'clock in the morning to hear any observations.

### Questions as to Increases in Officials' Salaries.

A number of objections were afterwards made to the Court, under section 40 of the Metropolis Water Act, 1902, that certain increases of salary which had been made by the Companies were not reasonably necessary in the ordinary course of business. The Companies affected were the Kent, Chelsea, West Middlesex, and Grand Junction.

Sir *William Hart Dyke*, M.P., Chairman of the Kent Company, was among the witnesses called in support of the action of the Companies. He said that the salary of the Secretary of that Company in 1900 was placed at a very low figure at that time—a tentative figure—but always with the intention of increasing it. It was raised to £600 in 1901; and in 1903 additions were made in the ordinary course of business.

Answering the PRESIDENT, witness said their scheme was that the Secretary should attain to a maximum salary of £1000 a year.

The Court retired to consider the cases. On their return,

The PRESIDENT said the conclusions the Arbitrators had arrived at were that in the Kent case they did not disallow the £900, but they

## GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 391.

| Issue. | Share. | When pay. Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 5 0,000 | 10 | Oct. 13 | 10½ | Alliance & Dublin 10 p.c. | 20½—21½ | .. | 4 17 8 |
| 100,000 | 10 | ,, | 7½ | Do. 7 p.c. | 13—14 | .. | 5 7 2 |
| 2.,0,000 | 5 | May 12 | 6½ | Bombay, Ltd.. . . . | 6¼—6¾ | .. | 4 16 4 |
| 140,c00 | 5 | ,, | 6½ | Do. New, £4 paid | 4¾—5⅛ | .. | 4 18 11 |
| 50,000 | 10 | Aug. 31 | 14 | Bourne- ) 10 p c. . . | 29—30 | .. | 4 13 4 |
| 251,810 | 10 | ,, | 7 | mouth Gas ) B 7 p.c. . | 15—16 | .. | 4 7 6 |
| 53,200 | 10 | ,, | 6 | and Water ) Pref. 6 p.c. | 14½—15½ | .. | 3 17 5 |
| 380,000 | Stk. | Aug. 12 | 12 | Brentford Consolidated | 2,5 · 240 | .. | 5 0 0 |
| 300,000 | ,, | ,, | 9 | Do. New . . . | 178—183 | .. | 4 18 4 |
| 50,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . | 125—130 | .. | 3 16 11 |
| 206,250 | ,, | June 10 | 4 | Do. 4 p.c. Deb. . | 104—107 | +2 | 3 14 9 |
| 220,000 | Stk. | Sept. 15 | 11 | Brighton & Hove Orig. | 209—214 | +2 | 5 2 10 |
| 246,320 | ,, | ,, | 8 | Do. A. Ord. Stk. . | 150—155 | +2 | 5 3 3 |
| 4c0,000 | 20 | Sept. 29 | 10 | British . . . . . | 39 · 40 | +½ | 5 0 0 |
| 100,000 | Stk. | Aug. 12 | 6 | Bromley, Ord. 5 p.c. . | 115—120 | .. | 5 0 0 |
| 165,7 0 | ,, | ,, | 4¼ | Do. do. 3½ p.c. . | 90—95 | .. | 4 14 9 |
| 500,000 | 0 | Oct. 13 | 7 | Buenos Ayres (New) Ltd. | 11¼—11⅜ | . | 5 19 2 |
| 250,000 | Stk. | June 29 | 4 | Do. 4 p.c. Deb. . | 9⁵—94 | .. | 4 5 1 |
| 150,000 | 20 | July 14 | 8½ | Cagliari, Ltd. . . . . | 22—24 | . | 6 17 6 |
| 100,0 0 | 10 | Sept. 29 | 10 | Cape Town & Dis , Ltd. | 14—14½ | .. | 6 17 11 |
| 10 ,000 | 10 | Oct. 27 | 4½ | Do. 4½ p c Pref . . | 9—9⅝* | .. | 4 14 9 |
| 50,000 | 50 | Nov. 2 | 6 | Do. 6 p.c. 1st Mort. | 51—53* | +⅜ | 5 13 2 |
| 50,000 | Stk. | June 29 | 4½ | Do. 4½ p.c. Deb. Stk. | 98—100 | .. | 4 10 0 |
| 1,375,000 | Stk. | Aug. 31 | 5⅛ | Commercial 4 p c Stk. . | 108—112 | .. | 4 12 10 |
| 560,000 | ,, | ,, | 5 | Do. 3½ p.c. do. . | 104—107 | .. | 4 13 6 |
| 450,000 | ,, | June 10 | 3 | Do. 3 p.c. Deb. Stk. | 86—88 | .. | 3 8 2 |
| 800,000 | Stk. | June 10 | 6 | Continental Union, Ltd. | 102—107 | .. | 5 12 2 |
| 200,000 | ,, | ,, | 7 | Do. 7 p c. Pref. | 135—140 | .. | 5 0 0 |
| 486,c90 | 10 | July 14 | 11 | European, Ltd. . . . | 19⅓—20½ | .. | 5 7 4 |
| 354,060 | 10 | ,, | 11 | Do. £7 10s paid | 14—15 | .. | 5 10 0 |
| 15,243,200 | Stk. | Aug. 12 | 4⅛ | Gas- ) 4 p.c. Ord. . . | 94—95 | −½ | 4 12 7 |
| 2,600,000 | ,, | ,, | 3½ | light ) 3½ p.c. max. . . | 89—91 | .. | 3 16 11 |
| 3,799,735 | ,, | ,, | 4 | and ) 4 p.c. Con. Pref. | 107—109 | −½ | 3 13 5 |
| 4,193,975 | ,, | June 29 | 3 | Coke ) 3 p.c. Con. Deb. | 87—89 | .. | 3 7 5 |
| 258,740 | Stk. | Sept. 15 | 5 | Hastings & St. L. 3½ p.c. | 90—95 | .. | 5 5 3 |
| 70,000 | 10 | Sept. 29 | 11 | Hongkong & China, Ltd. | 15—16 | .. | 6 17 6 |
| 3,800,000 | Stk, | May 12 | 10 | Imperial Continental . | 210—213 | −1 | 4 13 11 |
| 473,600 | Stk. | Aug. 12 | 3½ | Do. 3½ p.c. Deb. Red. | 95—98 | .. | 3 11 4 |
| 175,036 | Stk. | Aug. 31 | 6 | Lea Bridge Ord. 5 p.c. . | 115—120 | .. | 5 0 0 |
| 561,000 | Stk. | Aug. 31 | 10 | Liverpool United A . . | 218—220 | .. | 4 10 11 |
| 718,100 | ,, | ,, | 7 | Do. do. B . . | 158—160 | .. | 4 7 6 |
| 306,083 | ,, | June 29 | 4 | Do. do. Deb. Stk. | 106—108 | .. | 3 14 1 |
| 75,c00 | 5 | June 29 | 5 | Malta & Medn., Ltd. . | 4¼—4¾ | .. | 5 5 3 |
| 560,000 | 100 | Oct. 1 | 5 | Met. of ) 5 p.c. Deb.. | 101—103 | .. | 4 17 1 |
| 250,000 | 100 | ,, | 4½ | Melbourne ) 4½ p.c. Deb. | 100—102 | .. | 4 8 3 |
| 541,920 | 20 | May 27 | 3½ | Monte Video, Ltd. . . | 10½—11½ | .. | 6 1 9 |
| 1,515,892 | Stk. | July 29 | 4½ | Newc'tle & G'tesh'd Con. | 107—110 | +1¼ | 4 3 4 |
| 406, 25 | Stk. | July 1 | 3½ | Do. 3½ p.c. Deb. | 92—92½ | .. | 3 15 8 |
| 15,0c0 | 10 | Aug. 31 | 10 | North Middlesex 10 p.c. | 19—20 | .. | 5 0 0 |
| 52,940 | 1 ) | ,, | 7 | Do. 7 p.c. | 13—14 | .. | 5 0 0 |
| 300,c00 | Stk. | May 12 | 8 | Oriental, Ltd. . . . | 145—150 | +3 | 5 6 8 |
| 600,000 | 5 | Sept. 15 | 7 | Ottoman, Ltd. . . | 5½—6½ | .. | 5 12 0 |
| 235,005 | Stk. | — | 6½ | Plym'th & St'house 5 p.c. | — | .. | — |
| 398,490 | 5 | Apl. 28 | 5 | Primitiva Ord. . . . | 5¼—5¾ | .. | 4 6 11 |
| 796,980 | 5 | July 28 | 5 | Do. 5 p.c. Pref. . | 4¾—5 | .. | 5 0 0 |
| 488,900 | 10 ) | June 1 | 4 | Do. 4 p.c. Deb. . | 93—95 | .. | 4 4 3 |
| 851,070 | 10 | Oct. 13 | 7 | River Plate Ord. . . . | 11¼—11⅜ | .. | 5 19 2 |
| 300,000 | Stk. | June 29 | 4 | Do. 4 p.c. Deb. . | 94—96 | .. | 4 3 4 |
| 250,000 | 10 | Sept. 15 | 6 | San Paulo, Ltd. . . . | 12—13 | .. | 4 12 4 |
| 70,0 0 | 50 | June 29 | 5 | Do. 5 p.c. Deb. . | 51—53 | +2 | 4 14 4 |
| 135, 00 | Stk. | Sept. 15 | 10 | Sheffield A . . . . | 237—239 | .. | 4 3 8 |
| 209,984 | ,, | ,, | 10 | Do. B . . . . | 23⁵—238 | .. | 4 4 0 |
| 523,498 | ,, | ,, | 10 | Do. C . . . . | 236—238 | .. | 4 4 0 |
| 123,998 | Stk. | Sept. 29 | 5 | Shrews' ury Ord. 5 p.c. | 104½—107½ | .. | 4 13 0 |
| 70,000 | 10 | ,, | 11 | South African . . . . | 16—17 | +1 | 6 9 5 |
| 6,250,c00 | Stk. | Aug. 12 | 5⅜ | South Met., 4 p.c. Ord. | 127—129 | .. | 4 5 3 |
| 1,832,700 | ,, | July 14 | 3 | Do. 3 p.c. Deb. | 87—89 | .. | 3 7 5 |
| 575,0 0 | Stk. | Aug. 31 | 5½ | S'th Suburb'n Ord. 5 p.c. | 118—123 | .. | 4 9 5 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . . | 129— 25 | .. | 4 0 0 |
| 112,533 | ,, | July 14 | 5 | Do. 5 p c. Deb. Stk. | 133—138 | .. | 3 12 6 |
| 380,940 | Stk. | May 12 | 5 | Southampton Ord. . . | 105—110 | .. | 4 10 11 |
| 87,950 | ,, | — | 4 | Do. 4 p.c. Deb. | — | .. | — |
| 120,000 | Stk. | Aug. 31 | 6¼ | Tottenham ) A 5 p c. . | 120—125 | .. | 5 0 0 |
| 325,520 | ,, | ,, | 4¾ | and ) B 3½ p.c. . | 95—100 | .. | 4 15 0 |
| 115,000 | ,, | June 29 | 4 | Edmonton ) 4 p.c. Deb. | 104—107 | .. | 3 14 9 |
| 182,380 | 10 | June 10 | 8 | Tuscan, Ltd. . . . . | 8¼—8¾ | −¼ | 9 2 10 |
| 149,900 | 10 | July 1 | 5 | Do. 5 p c. Deb. Red. | 96—98 | .. | 5 2 0 |
| 30,000 | Stk. | Aug. 31 | 7¾ | Wands- ) A 5 p.c. . . | 150—·55 | .. | 5 0 0 |
| 255,636 | ,, | ,, | 6¾ | worth ) B 3½ p.c. . . | 120—125 | .. | 5 0 0 |
| 50,000 | ,, | ,, | 5 1/16 | and ) C 3½ p.c. . . | 102—107 | .. | 4 18 2 |
| 59,416 | ,, | June 29 | 3 | Putney ) 3 p.c. Deb. Stk. | 78—83 | .. | 5 12 8 |
| 745,872 | ,, | Aug. 12 | 5 | West Ham 5 p.c. Ord. . | 97—99 | .. | 5 1 0 |
| 85,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . | 115—120 | .. | 4 3 4 |
| 160,000 | ,, | June 29 | 4 | Do. 4 p.c. Deb. Stk. | 103—108 | .. | 3 14 1 |

Prices marked * are Ex div.

disallowed the further £100 which was to take effect at a subsequent date. They directed that no costs should be paid on either side. With regard to the Grand Junction case, they disallowed the application respecting an increase of £100 a year, and directed the Company to pay the costs. They dismissed the applications of the West Middlesex and Chelsea Companies, with costs.

## PROPOSED WATER-WORKS PURCHASE AT WHITBY.

At the Monthly Meeting of the Whitby Urban District Council last Tuesday, Mr. Henry Walker moved that the standing orders be suspended, and that he be allowed, as a matter of urgency, to move: "That the Directors of the Whitby Water-Works Company be asked to sell their undertaking to the Council—the Council paying for it 33 years' purchase of the average dividend distributed during the last ten years, and assuming the mortgage liability of the Company, and the liability to Messrs. Foster; the Company retaining all moneys held by them or due to them on the date of transfer, and to discharge all claims against them to that date, except for stock (other than water) and materials in hand necessary for working and carrying on the undertaking; the Council to take over all the present agents, officers, and servants of the Company, and continue them (subject to good behaviour) in their various offices and employments; the price of the undertaking to be paid by the issue of perpetual annuities by the Council to the Company's shareholders, calculated as above (or as may be agreed), equal to 3½ per cent. on 33 years' purchase of the ten years' average dividend. Should the Company accept, the Council to embody the terms in their pending Act of Parliament." Mr. C. H. Reynolds seconded the suspension of standing orders, which was unanimously agreed to. Mr. Walker said the motion to purchase the water-works should be treated as a matter of emergency. Mr. R. Smith remarked that both inside and outside the Council Chamber considerable comment had been caused by the fact that the Council were seeking to expropriate the two Companies. The town had been held up to ridicule and thoroughly denounced, though not deserving it. Mr. W. N. Walker said the Council should very carefully consider the proposed undertakings. The town ought to know what the increased rate was going to be. Mr. W. Brown supported the motion; and after a brief debate it was carried by seven votes against six.

As the result, it may be assumed, of recent events, Messrs. J. Defries and Son, Limited, have been instructed to provide patriotic crystal decorative illuminations for a much larger number of City and West-End institutions than is usually the case in honour of the King's Birthday.

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

This has been a busy day with the Scottish Junior Gas Association; both Districts having had outings. Dealing first with that of the Eastern District, as of less importance to the gas manufacturer than the other—being a visit to the Newbattle Collieries of the Lothian Coal Company, Limited—I may say that it was exceedingly enjoyable and largely instructive. The Lady Victoria pit of the Company is recognized to be equal to any, if it does not surpass all, of its kind in Scotland. Its equipment is a sight to engineers; coal handling and conveying being carried to perfection. But the pit is of more general consequence to the members of a Gas Association, in that it is the source of a very large quantity of the cannel which is used in gas-works far and near. It has been so since gas first began to be made; and it will be a satisfaction to many to have the assurance that the Company are the lessees of a field which yet contains a very extensive supply of the rich coal which has been so long depended upon for giving high-quality gas.

Turning to the meeting of the Western District, as will be seen from the report of the proceedings elsewhere in the "JOURNAL," two papers were read—one by Mr. C. M'Farlane, Chemist in the Tradeston Gas-Works of the Glasgow Corporation; the other by Mr. J. Bell, Assistant Gas Manager at Airdrie. Both dealt with the subject of purification, but on different lines. Mr. M'Farlane set himself the task of establishing the superiority of lime over oxide of iron purification, and submitted the results of tests made by him in support of this view. It is a little unfortunate that he disclosed the origin of his research, which was an attempt to discover whether or not a statement by Sir George Livesey as to the effect of carbonic acid in reducing the illuminating power of gas was well founded. It was quite right of him to make the tests, and to publish them; but as they were on so small a scale, they may not be taken as conclusive, in view of the probability that Sir George Livesey may be presumed to have dealt with large working results, as distinct from laboratory working. The paper would probably have been of more value had Mr. M'Farlane given his own results, and left them to find their level. It was, at the same time, quite a thoughtful paper, though its effect was in a contrary direction to the trend of practice in recent years. And here, again, it must be acknowledged that Mr. M'Farlane had the courage of his opinions, because he must have known that, in advocating purification by lime, he was running counter to the belief of most gas managers of the present day. In the discussion which followed the papers, two notable points were raised—one by Mr. W. A. White, of Falkirk, as to whether carbonic acid may not, to some extent, be a carrier of carburation; and the other by Mr. J. Webster, of Provan, as to whether it was cheaper to extract carbonic acid or to enrich so as to counteract its effect. These are both questions which are worthy of consideration; and the

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raising of them is an attestation to the value of the paper. Mr. Bell is an out-and-out advocate of purification by oxide; and he was able to make his paper noteworthy by his disclosure of the fact that at Airdrie they are working by a process which enables them to revivify the oxide *in situ*—which means, of course, that they are able to do away almost entirely with the nuisance which is created by revivification in the open air. At Airdrie the experimental stage is past. This is the most important feature of the paper, giving it almost the character of a revelation. It is a process which requires practically no extra plant, and consequently its adoption will not be hindered by considerations of cost. Taking both papers together, the feeling must be that the meeting has given another illustration of the vigour and capacity of junior gas engineers, and of the great value which the Junior Associations are, not only to the members themselves, but to the industry generally.

At the meeting of the Edinburgh and Leith Gas Commissioners on Monday, there was submitted an exceedingly handy document in the shape of the annual tabulated statement of gas manufacture, with cost of coal, wages, and other manufacturing and distribution charges placed to revenue account from Aug. 1, 1888. The figures relating to the past year were all given quite recently, and need not be repeated. But notice may be taken of the item of the total cost of coal, manufacture, and distribution, per 1000 cubic feet of gas made. For the past year, the figure was 17·02d.; in the preceding year, 19·27d.; and, going backwards, 22·77d., 25·57d., 20·22d., 20·47d., 22·77d., 22·28d., 21·03d., 22·87d., 29·31d., and so on, showing how great a reduction has been effected in late years. When the Commissioners came into existence in 1888, retort men's wages were 6½d. per hour; in the following year, they were raised to 7½d.; and five years ago to 8d., at which they now stand. Another item which may be referred to is the use of oil for the production of carburetted water gas. The process has been in operation for seven years. Beginning in 1898, the quantity of oil used was 1372 tons, and in the succeeding years the quantities were respectively 2638, 3252, 2862, 3418, 3834, and last year 1246 tons. Taken all over, the statement exhibits at a glance the position of the business from year to year, and discloses, on the whole, a highly progressive and satisfactory condition of affairs.

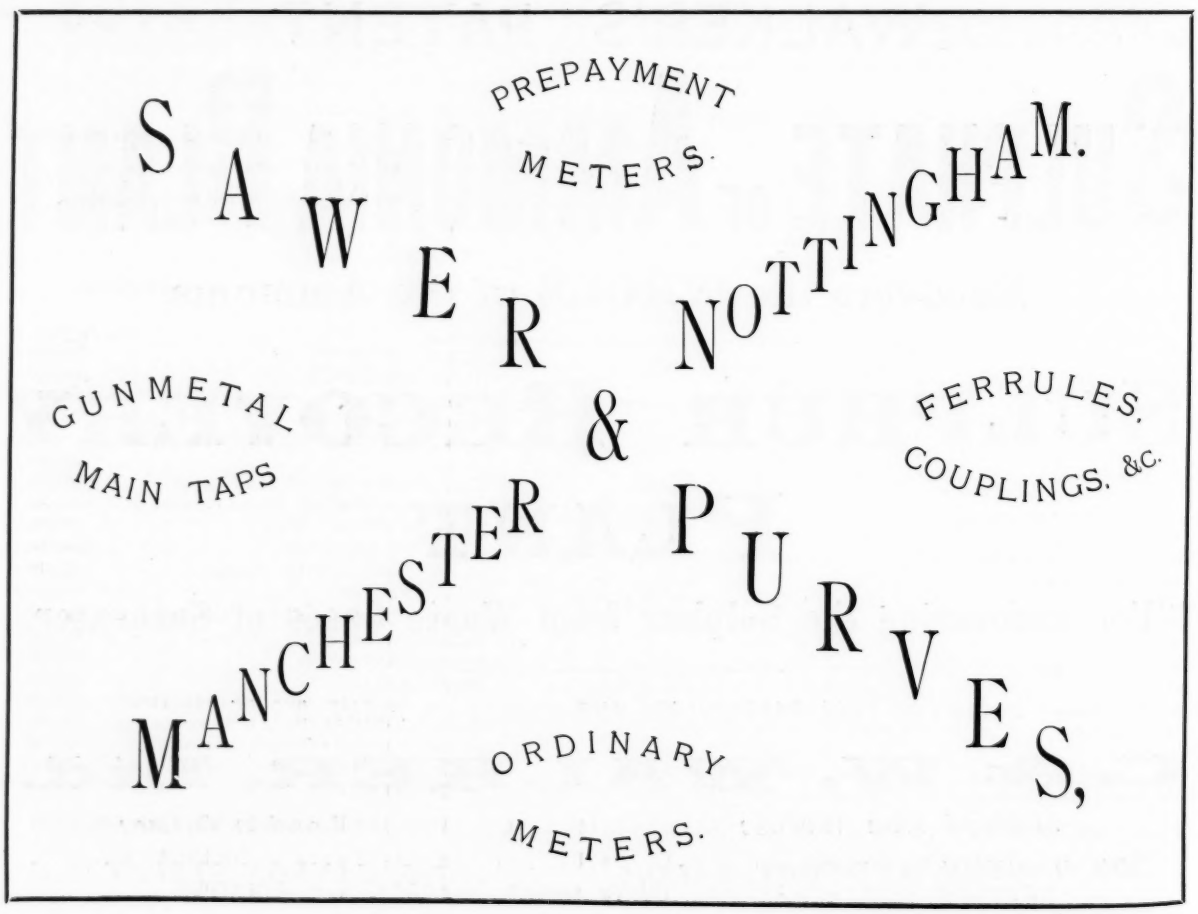
At a meeting of the Broughty Ferry Town Council last night, a letter from the Scotch Office was read, which practically puts an end to the difficulty which the Corporation had experienced with the Secretary for Scotland over their arrangements for coping with the financial trouble they have got into. The letter stated that it cannot be admitted that the gas guarantee rate is limited to defraying interest and annuity charges, and that the Castle Green Fund cannot be regarded as permanently reducing or wiping out the deficit upon the gas account. This sum must be repaid to the burgh general fund as soon as the gas deficit is provided for. It was suggested that the Council might, at the end of the financial year, when preparing their estimate for the ensuing year, reconsider the whole question, and endeavour to have the deficit wiped off in a shorter period than that proposed by the Council. The Council acquiesced in the terms of the letter. It is understood that there is no desire on the part of the Scotch Office that the price of gas should be increased; and it is considered as highly probable that, though the gas guarantee rate will require to be imposed, it will only be to a small extent.

The annual meeting of the Turriff Gaslight Company was held on Monday. The year began with a debit balance of £9. The income for the twelve months was £961; and the expenditure, including dividend, £782—leaving a credit balance of £179. It was resolved to reduce the price of gas from 7s. 1d. to 6s. 8d. per 1000 cubic feet. A dividend of 5 per cent. was declared.

The Monifieth Gaslight Company held their annual meeting on Monday. The Directors' report showed a highly satisfactory year's working. It was agreed to pay dividends at the rate of 4 per cent. on the preference, and 5 per cent. on the ordinary shares.

On Saturday last, an augmentation to the water supply of Paisley was formally inaugurated. The burgh water supply is derived from Camphill, near Largs. The work which has now been completed was decided upon about five years ago, and was necessitated owing to the existing piping being inadequate. There was abundance of water at Camphill, a great quantity of which was allowed to run to waste, because of the inability of the main-pipe to carry it. Mr. W. R. Copland, of Glasgow, was consulted by the Burgh Commissioners; and he advised the laying of an additional main from the reservoir at Camphill to the high-level filters at Rosebank, and a further new main from Rosebank to the high-level filters at Staneby. The first section is nine miles in length. The main which has been laid is 36 inches in diameter. In the work of laying it the greatest difficulty was encountered in the crossing of a wide stretch of bog land, where piling to a depth of quite 60 feet had to be resorted to. The new pipe and the old 24-inch main are together capable of delivering 20 million gallons of water per 24 hours; and as the daily consumption is 8 million gallons, it will be seen that ample provision has been made for future requirements, particularly as the mains between Rosebank and the town are capable of delivering 23 million gallons per day. The second section of the new main is six miles in length. The main which has been laid is partly 36 and partly 24 inches in diameter. The most serious obstacle in the laying of it was a cutting 22 feet in depth, through whinstone, for a distance of 300 yards. The cost of the works has been £90,000. The Contractors were: Messrs. D. Y. Stewart and Co., of Glasgow; T. Black and Co., of Paisley; and Wm. Kerr and Co., of Glasgow. At the opening ceremony, Mr. J. M. M'Callum, the Convener of the Water Committee, said the first water supply scheme for Paisley was opened in 1838. Provost Bell turned on the water. A few congratulatory sentences were spoken by the Earl of Glasgow; and the company afterwards drove into Largs, where they dined in the Royal Hotel. In the course of the proceedings at Camphill, Provost Bell was presented by Messrs. Stewart and Co. with a silver loving cup, and Mr. M'Callum was presented by Messrs. Kerr and Co. and Messrs. Black and Co. with a silver fish service.

A new water supply for Tarbert, Loch Fyne, was inaugurated on Monday; the water being turned on by Lady Ileene Campbell, of



Stonefield. The new works were designed by Messrs. Warren and Stuart, of Glasgow, and have cost £3500. Mr. Thos. Christie, Stirling, was the Contractor. A reservoir capable of holding 180,000 gallons of water has been constructed among the hills, at a place so inaccessible that the materials for its construction were carried to the place upon pack horses. At a banquet which followed the opening ceremony, the Contractor presented Lady Campbell with a silver rose bowl as a memento of the occasion.

## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 5.

**Sulphate of Ammonia.**

The week opened with good inquiry, and ready parcels were quickly picked up at last week's closing prices. Demand being sustained, the market improved, and towards the close there has been a sharp advance both for prompt and for delivery within the month; the closing quotations being £12 5s. per ton f.o.b. Hull, and £12 7s. 6d. per ton f.o.b. Liverpool and Leith. At the outset, direct buyers were disposed to hang back, and buying was mainly for covering November contracts; but later, the demand became more general, and substantial foreign orders have been placed. Although there has been good inquiry in the forward position, buyers hesitate to pay the premium demanded; while makers, observing the advance in the spot market, seem inclined either to advance their views, or to withdraw altogether.

**Nitrate of Soda.**

This article is very firm in all positions, and, local supplies being limited, spot prices have been advanced to 10s. 9d. and 11s. per cwt, for ordinary and refined qualities respectively.

LONDON, *Nov.* 7.

**Tar Products.**

The demand continues fairly good, and prices have been well maintained during the past week. In 90 per cent. benzol, further business has been done at 10d. per gallon London, and makers as a rule now ask 10¼d. to 10½d.; while in 50-90 per cent. several parcels have changed hands in the North at from 7¼d. to 7½d. There is nothing fresh to report in toluol, and the position remains unchanged. In solvent naphtha, the demand continues very good indeed, and prices are well maintained, especially in the London district. The market is very quiet in anthracene, and prices are, if anything, a little easier, as consumers appear utterly indifferent to the article as regards early delivery. As to creosote, prices are very firm in London; the demand for export still being very strong. But in the North, there is a decidedly quiet tone, and there are considerable quantities offering for early delivery. Carbolic acid continues very firm, and prices show signs of advancing still higher. For 60's, 2s. 2d. is reported to have been paid in London; while 2s. 1½d. has been realized for November-December delivery in more than one instance in the North of England. There is not so much inquiry over the first six months of next year, for which period there are sellers at 2s. 3d. per gallon; but consumers at present decline to consider business on this basis. In crystals, there is certainly more demand, and manufacturers as a rule do not care to offer for forward delivery. There has been a fairly good business done during the past week; but prices have not transpired, most of the sales having been effected by the German producers. Pitch continues firm. London manufacturers sold largely in the early part of the week at 32s. 6d. Sales are reported at the close at 33s. per ton for forward delivery, while makers now are showing a disinclination to quote until the rise shall have further developed. There is also a good demand in South Wales for forward delivery; but consumers do not seem inclined to pay the equivalent of prices at present asked by manufacturers. A very good business has also been done in Yorkshire makes, which appear to be in good demand just at present for consumption in Belgium, where this quality is very much appreciated.

The average values during the week were: Tar, 17s. 6d. to 21s. Pitch, London, 32s. 6d. to 33s.; east coast, 31s. to 32s.; west coast, 28s. 6d. to 30s. Benzol, 90 per cent., 10¼d. to 10½d.; 50-90 per cent., 7¼d. to 7½d. Toluol, 7d. Crude naphtha, 3¼d.; solvent naphtha, 8½d. to 9d.; heavy naphtha, 10d. to 10¼d. Creosote, London, 1⅝d.; North, 1¼d. to 1⅜d. Heavy oils, 2 1/16d. to 2⅛d. Carbolic acid, 60 per cent., 2s. ½d. to 2s. 2d. Refined naphthalene, £4 to £9; salts, 21s. to 22s. 6d. Anthracene, "A" quality, 1⅜d. to 1⅝d.; "B" quality, 1d., nominal.

**Sulphate of Ammonia.**

The demand has been very strong during the past week for both prompt and forward delivery. So far as London is concerned, Beckton are not offering anything just at present; but the nominal price may be taken as £12 7s. 6d. for November-December. The South Metropolitan Company are also practically out of the market for early delivery, and are not at the moment quoting forward. In Hull, business has been done at £12 5s. for prompt; while for December delivery £12 7s. 6d. is reported to have been paid for special makes. In Leith, the demand continues very good; but makers as a rule have declined to sell—£12 10s. having in more than one instance being refused for early delivery, while so far as January-June is concerned, the largest producers decline to quote.

**Reduction in Price.**—The Directors of the Oxford Gas Company have decided to reduce the price of gas 2d. per 1000 cubic feet as from Jan. 1 next.


# CARBURETTED WATER-GAS APPARATUS

**Merrifield—Westcott—Pearson Patents.**

## The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

**London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.**
**American Offices: TORONTO.** TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

**The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—**

| | Cub. Ft. Daily. | | Cub. Ft. Daily. | | Cub. Ft. Daily. |
|---|---|---|---|---|---|
| BLACKBURN | 1,250,000 | ST. CATHERINES (Remodelled) | 250,000 | TONBRIDGE | 300,000 |
| WINDSOR ST. WORKS, BIRMINGHAM | 2,000,000 | KINGSTON, PA. | 125,000 | STRETFORD | 800,000 |
| SALTLEY WORKS, BIRMINGHAM | 2,000,000 | PETERBOROUGH, ONT. | 250,000 | OLDBURY | 300,000 |
| COLCHESTER | 300,000 | WILKESBARRE, PA. | 750,000 | TODMORDEN | 500,000 |
| BIRKENHEAD | 2,250,000 | ST. CATHERINES (2nd Cont) | 250,000 | SALTLEY, BIRMINGHAM (Third Contract) | 2,000,000 |
| SWINDON (New Swindon Gas Co.) | 120,000 | BUFFALO, N.Y. | 2,000,000 | YORK (Second Contract) | 750,000 |
| SALTLEY, BIRMINGHAM (Second Contract) | 2,000,000 | WINNIPEG, MAN. | 500,000 | ROCHESTER (Second Contract) | 500,000 |
| WINDSOR ST., BIRMINGHAM (Second Contract) | 2,000,000 | COLCHESTER (Second Contract) | 300,000 | NEWPORT (MON.) | 250,000 |
| HALIFAX | 1,000,000 | YORK | 750,000 | TOKIO, JAPAN | 1,000,000 |
| TORONTO | 250,000 | ROCHESTER | 500,000 | PERNAMBUCO (Brazil) | 125,000 |
| OTTAWA | 250,000 | KINGSTON, ONT. | 300,000 | MALTON | 150,000 |
| LINDSAY (Remodelled) | 125,000 | CRYSTAL PALACE DISTRICT | 2,000,000 | DULUTH, MINN. (2nd Cont) | 300,000 |
| MONTREAL | 500,000 | CATERHAM | 150,000 | BROCKVILLE (ONT.) | 250,000 |
| TORONTO (Second Contract Remodelled) | 2,000,000 | LEICESTER | 2,000,000 | SMETHWICK | 500,000 |
| BELLEVILLE | 250,000 | ENSCHEDE (HOLLAND) | 150,000 | GRAVESEND | 300,000 |
| OTTAWA (Second Contract) | 250,000 | BUENOS AYRES (RIVER PLATE CO.) | 700,000 | NEWPORT MON. (Second Contract) | 250,000 |
| BRANTFORD (Remodelled) | 200,000 | BURNLEY | 1,500,000 | TORONTO (Third Contract) | 750,000 |
| | | KINGSTON-ON-THAMES | 1,750,000 | TORONTO (Fourth Contract) | 1,000,000 |
| | | ACCRINGTON | 500,000 | MONTREAL, ONT. (2nd Cont.) | 1,800,000 |
| | | | | HAMILTON, ONT. | 400,000 |

**LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.**

**AND, IN ADDITION, 4,000,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.**

## COAL TRADE REPORTS.

**Lancashire Coal Trade.**

Owing to the mildness of the weather, house coal is not much in request; and the sales are below the average at this season of the year. Still, there has been a sensible increase in the output during the last ten days. Coal for forge and engine purposes has met with a better demand, and washed slack is still difficult to get, except in small lots. Coal for export is being moved to the Ship Canal in response to fresh contracts for the next three months. On the whole, there has been a steady increase in the demand for coal of all descriptions—so much so, in fact, that the miners, besides being kept at work on full time, are beginning to hope for some return of the 5 per cent. in wages which was taken off a short time ago. The question of any application for an increase of wages has, however, been settled for the present; for the Coal Conciliation Board, at their usual quarterly conference last week, were satisfied that the present improvement was not due to any permanent forces, but was merely the result of the ordinary winter demand. Miners and employers are agreed that there is no present prospect of better trade; and so no application will be made for a change in wages for at least another three months. Prices remain unchanged from last week—viz., best house coal 13s. to 14s. per ton at the pits, seconds 11s. to 12s., inferior 9s. to 10s.; best steam forge coal 8s. to 8s. 6d., secondary 7s. 6d. to 7s. 9d.; best slack 6s. to 6s. 6d., secondary 5s. to 5s. 6d., common 4s. to 4s. 6d.

**Northern Coal Trade.**

There is a better demand for some classes of coal; and the collieries seem to have generally full work, though the forward orders for steam coals are not very numerous. In the steam coal trade, best Northumbrian kinds are 9s. per ton f.o.b., second-class steams are about 8s. 3d., and steam smalls are from 4s. to 4s. 6d. Gas coals show, in firmness of price for the best qualities, the effect of the fuller demand. Some collieries have the bulk of their output taken up by the contracts—the deliveries on which are very heavy now; and they are able to ask high prices for the surplus that they have. Generally, the quotation varies from 7s. 10d. to 8s. 6d. per ton f.o.b., according to quality, with the exceptions just referred to. Additional gas-coal contracts this week are not numerous, nor are they important. Gas coke varies considerably. Exports contracted for some time ago are quoted 13s. per ton f.o.b., but good gas coke has been named of late at lower prices, probably because of the increasing output.

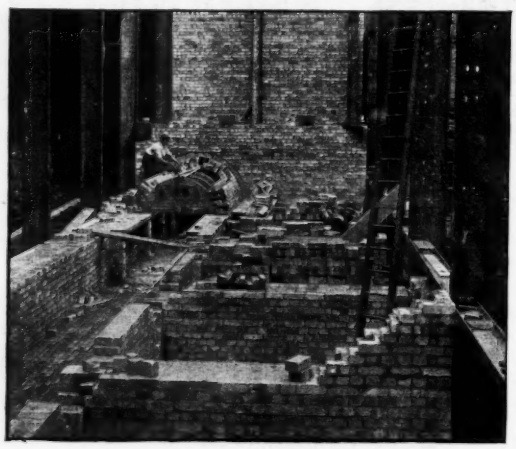
**Scotch Coal Trade.**

There is more coal on the market than can be sold; but it is expected that matters may improve soon. Prices have not gone back, which is the best evidence that the depression is only temporary. Another attempt was made in Glasgow last week to arrive at a settlement upon the question of wages; but it did not result in any agreement—the meeting being adjourned till to-day, without any explanation being given as to what turn the deliberations took. The prices quoted are: Main 7s. 3d. to 7s. 6d. per ton f.o.b. Glasgow, ell 8s. to 9s., and splint 9s. to 9s. 3d. The shipments for the week amounted to 257,535 tons—a decrease of 20,278 tons upon the preceding week, but an increase of 4645 tons upon the corresponding week of last year. For the year to date, the total shipments have been 9,707,676 tons—an increase of 345,535 tons upon the same period of last year.

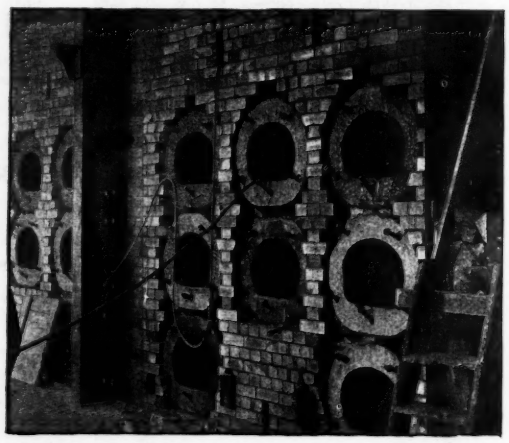
**Proposed Purchase of the Chippenham Gas-Works.**—It was reported at the recent monthly meeting of the Chippenham Urban District Council that the Solicitors to the Gas Company had written stating that the Directors declined the offer of £30,000 made by the Council for the purchase of the undertaking, but that they were prepared to have a conference with the Gas Committee on the subject. It was decided to consider the communication in Committee.

**Incandescent Gas Lighting in Florence.**—A contract has been entered into by the Municipality of Florence with the Gas Company to alter the system of street lighting to incandescent burners. The most important clauses in the agreement are the guarantee by the Company that the consumption per annum will be about 42¼ million cubic feet, to be increased in ten years to a minimum of 49½ millions, at the rate of not less than 708,000 cubic feet per annum. There will be a corresponding augmentation in the number of street-lamps. When the price of the best quality of mantles increases or decreases to the extent of being 2½d. or less each, the additional quantity of gas allowed per effective hour of lighting, in order to compensate for working expenses, maintenance, &c., will be 0·38 cubic foot instead of 0·53 cubic foot. When the price exceeds 7½d., the difference between this and the cost will be repaid by the Company.

**Sales of Stocks and Shares.**—At the Mart, Tokenhouse Yard, last Wednesday, Mr. Alfred Richards placed, by order of the Directors, an issue of £20,000 of new ordinary "B" stock of the Southend Gas Company. This stock ranks for a dividend of 5 per cent.; but the last was at the rate of £5 2s. 6d. It was offered in £100 lots, which were sold at from par to £102. On the same occasion, he carried out the instructions of Executors to dispose of stocks and shares in other Gas Companies. A small parcel of "B" consolidated stock of the Tottenham and Edmonton Gas Company, carrying 4¾ per cent. dividend, was sold at £101 5s. per £100; and £100 of similar stock of the Croydon Gas Company, carrying 11½ per cent., at £231. Some £10 shares in the South African Lighting Association were placed at from £16 to £16 10s. each; and 40 fully-paid £5 ordinary shares in the Colonial Gas Association realized £3 10s. each, *cum div.* The last lots offered consisted of consolidated stock of the Maidstone Gas Company (last dividend £7 12s. 6d. per cent.); and they fetched £142 to £143 per £100. On the same day, at Wellingborough, Messrs. Pendered and Son sold some original shares in the Irthlingborough Gas Company at £19 15s. each.

JULY 25th, 1904.



OCTOBER 15th, 1904.

**12 Beds of Inclined Retorts, Erected by us, the whole of the Work being done by our own Men.**

**RESULTS GUARANTEED.**

**NEW CONVEYOR CO., LTD., SMETHWICK.**

Director and Manager, A. S. B. LITTLE. Secretary, W. T. HOLLAND.

**Peterborough Water-Works Extensions.**—The Peterborough Town Council are about to undertake the laying of a new water-main from an additional source of supply at Etton, more than 5 miles from the city. On Friday evening, tenders were opened for iron pipes, and that of the Stanton Iron Company at £8177 was accepted, subject to the firmagreeing to the fair wages clause. Messrs. Blakeborough and Sons' tender for valves, at £109, was accepted. The Corporation will lay the main themselves, and proceed immediately with the work, for the purpose of giving employment to a large number of men who are at present doing nothing.

**Reduction in Price at Hyde.**—At the half-yearly meeting of the Hyde Gas Company last Tuesday, it was announced that the price of gas would be reduced from 2s. 9d. to 2s. 6d. per 1000 cubic feet as from the end of the current quarter. The consumers have no cause to complain of want of consideration by the Gas Company. The price charged at the end of March, 1903, was 3s. 4d., with discounts of 5d. to 7d., per 1000 cubic feet. From the 1st of April it was reduced to 3s., with 4d. to 7d. discount; on April 1 last it was brought down to 2s. 9d., with the same discounts; and now a further 3d. has been taken off, and the supply to prepayment consumers increased from 25 to 30 cubic feet of gas for 1d.

**The Public Lighting of Westminster.**—The Works Committee of the Westminster City Council reported last Tuesday that the time for giving twelve months' notice to terminate the agreement with the St. James's and Pall Mall Electric Light Company, Limited, for the public lighting of the Parish of St. James, would expire on the 7th inst. The Committee had decided to give this notice, and to instruct the City Engineer to obtain competitive tenders from gas and electricity companies for the lighting of the area. The Committee further reported that they had resolved to light Wood Street (part of the Westminster improvement) with gas-lamps fitted with single incandescent burners at a cost of £2 11s. 9d. per lamp, and an annual maintenance charge to the Gaslight and Coke Company at £3 5s.

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The more gas consumers know about the manufacture of gas, the less likely are they to grumble (which we have it on the authority of "Box and Cox" means to "complain without a cause") at the commodity sent out to them from the gas-works for their consumption. The Engineer and Manager of the Gravesend and Milton Gas Company (Mr. Joseph Davis) did a judicious thing, therefore, when he conversed freely with an interviewer from the "Gravesend and Northfleet Standard" a few days ago, and enabled that gentleman to enlighten the readers of the paper in a column article. It is to be hoped they will profit by what they read; but if they need more information, Mr. Davis will be only too pleased to give it. For instance, on the subject of manuring, the market gardeners of Kent may possibly have something to learn; and therefore they could not do better than turn their attention to sulphate of ammonia, instructions as to the use of which can be readily obtained from Mr. Davis.

Among the new joint-stock companies lately registered are Schnell's Patent Lamp Company, Limited, with a capital of £10,000, in £1 shares, to acquire Schnell's automatic self-feeding wickless burner and vaporizer for generating vapour from light and heavy hydrocarbon and other oils for lighting, heating, cooking, and other purposes; and the British Acetylene Gas Company (Liverpool), Limited, with a capital of £4000, in £1 shares, to acquire the business carried on by Messrs. R. F. N. Woodforde and J. A. Smith as the British Acetylene Gas Company, and to carry on the business of acetylene lighting engineers, manufacturers of gas generators and purifiers, and gas apparatus generally, &c.

The employees of Messrs. Samuel Gratrix, Jun., and Bros., Limited, to the number of about 240, were entertained at tea by the firm, at the Belle Vue Gardens, Manchester, on Saturday, the 22nd ult., in commemoration of fifty years of service by the Managing-Director, Mr. William Mills. During the proceedings after tea, the Chairman of the Company (Mr. Samuel Gratrix) made a presentation to Mr. Mills, on behalf of the firm, of a handsome tea and coffee set; and in the course of his remarks alluded to the faithful service of Mr. Mills during his long connection with the concern. Mr. Stevenson, one of the Directors, also referred to the way in which Mr. Mills had always conducted himself during the 45 years he had been associated with him; while Mr. W. H. Daniels, the senior traveller, dwelt upon the rapid advance the business had made under Mr. Mills's management. Mr. Gratrix, on behalf of the employees, presented Mr. Mills with a silver rose bowl on an ebony pedestal with a suitable inscription, the cost of which had been subscribed to by every person in their establishment. Mr. Mills briefly replied, and gave the rising generation some good advice for their success in life.

There was a large gathering at the Hastings Gas-Works recently, on the occasion of the annual smoking concert and presentation of prizes in connection with the cricket club. Mr. C. E. Botley (Engineer and Manager) presided; and Mr. C. F. Botley (the Assistant-Engineer and Electrician) occupied the vice-chair. In the course of the proceedings, the latter referred to the opposition the Company met with from the Corporation with their electric lighting, and he showed that whereas the lighting of 4 miles of streets cost £4000 annually, the Company supplied 80 miles at a total cost of £6500. The prizes having been presented, the health of the President of the club was cordially drunk. The Chairman, in replying, thanked his staff and all the employees for the assistance they had given in opening the new works, by means of which, and with every modern advantage, they would be able to be second to none. He then proceeded to give a brief description of his long tour in the United States and Canada, which he said was not only a visit for pleasure but one to gain experience. He was greatly struck by the go-a-headness of the Americans. But though he had heard so much about America, he did not think they in England had anything to fear, though the people across the water did things much quicker.


BRADDOCK'S NEW PATENT

# GAS STATION GOVERNOR

THE BEST GOVERNOR OBTAINABLE.

Most compact and convenient.

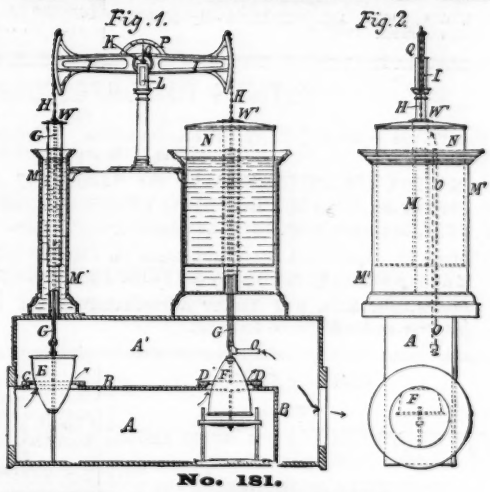
Unsurpassed for Durability,

Efficiency, and Reliability.

OVER 80 (4 in. to 36 in. inclusive) SUPPLIED.

*Full Particulars, Illustrated Sheets, &c., free by post upon application.*

WHEN THE GOVERNOR IS FITTED WITH




BRADDOCK'S PATENT "SELF-LOADING" APPARATUS

The outlet pressure is automatically and gradually varied, within any predetermined and fixed limits, according to the demand for gas being small or large.

First Cost soon saved. A proved success. Repeat Orders received.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), Globe Meter Works, OLDHAM,

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

Telegrams: "BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

The Pulsometer Engineering Company, Limited, of Reading and London, are circulating a neatly-printed pamphlet on the subject of softening water. The matter consists of some interesting general remarks, followed by a description of the Company's "Criton" water softener, which is very effectively illustrated. It is worthy of the attention of all who have to deal with hard water, as it will treat quantities ranging from 300 up to 6500 gallons per hour, and at the same time is very compact.

Two cases of interest to suppliers of gas through prepayment meters were heard at the Devonport Police Court last Wednesday. In the first, John M'Gregor was summoned by the Corporation for payment of the sum of 6s. 4d., for gas consumed between Sept. 9 and Oct. 21. Mr. R. C. Graves (Assistant Town Clerk) contended that there was in the use of prepayment gas-meters an implied condition that the meter and its contents should be kept in proper custody. Frederick Rowe, collector of slot-meter accounts, said that when he called at the defendant's house on the 9th of September, the index read 20,900 cubic feet, and on the 21st of October, when he next called, it stood at 24,100 cubic feet—showing a consumption in the meantime of 3200 cubic feet. There should have been 10s. 8d. in the money-box; but on opening it he only found 4d. When questioned, defendant said that two days before a man carrying a black bag collected the money from the meter. He did not know how much the man took, and would not be able to identify him again. Witness made inquiries in the neighbourhood; but no man such as had been described by the defendant had called at any of the houses. Defendant drew attention to the fact that he was only summoned for 6s. 8d., though according to the index a larger sum was due. Mr. Graves could not explain how the discrepancy arose. The Magistrates' Clerk said he thought the Corporation had no case against the present defendant. Directly a person placed a penny in the slot, he paid for the gas. Mr. Graves contended that neither the defendant nor his wife should have allowed a stranger to go to the meter. The Magistrates' Clerk said he should have known whether or not the man was from the Corporation. Mr. Littleton, one of the Magistrates, said he had been a member of the Corporation for years, and did not know that the witness Rowe was a collector. Mr. Graves said defendant did not get a receipt, which was always given. The Magistrates' Clerk said defendant was not bound to get a receipt. He thought all the Corporation could do was to prosecute someone for stealing their money. Mr. Graves said the defendant belonged to just the class of people who insisted on having a receipt. It was a clear case of negligence. Defendant's wife said she recognized Rowe as a collector, but did not know the man who called on the 19th of October. He said he had "come for the gas," opened the meter with a key, and took the money. When she asked him for a receipt, he said he would come back with one; but he did not return. The Magistrates dismissed the summons; but, on the application of Mr. Graves, he agreed to state a case. On the same occasion, William Poynter was summoned in respect of 3s. for gas supplied. In this case, defendant had removed from one house to another in the same street. When the collector called at the old place, there was no money in the meter, though the index registered a consumption of 900 cubic feet. Defendant's wife said she gave notice of her change of residence at the gas-works, but no record of the fact could be found there. The case was withdrawn.

## WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

### Situations Vacant.

DRAUGHTSMAN. No. 4291.
EXHIBITION ATTENDANT. No. 4290.
FOREMAN. Stockport Gas Department.
GAS FITTERS. Ilford Gas Company.
GAS FITTERS. Richmond Gas Stove and Meter Company.
LEADING STOKER. Sunbury-on-Thames Gas-Works.
MANAGER (AMERICA). No. 4287.
SUPERINTENDENT OF DISTRIBUTION DEPARTMENT No 4286. Applications by Nov. 14.
WORKING MANAGER (SMALL WORKS). No. 4289.

### Situations Wanted.

ASSISTANT GAS ENGINEER. R. G., Westminster.
ATTENDANT (LADY) AT GAS EXHIBITION. No. 4288.
ENGINEER AND MANAGER. No. 4284.

### Plant for Sale.

ENGINES, EXHAUSTER, VALVES, &c. Frome Gas Company.
PUMPING ENGINE, &c. Messrs. Taylor, Sons, and Santo Crimp, Westminster.

### Company Meeting.

ORIENTAL GAS COMPANY. Offices. Nov. 16. Twelve o'clock.

### Stocks and Shares.

ALDERSHOT GAS AND WATER COMPANY. Nov. 15.
GREAT YARMOUTH WATER-WORKS. Nov. 12.
HARROW AND STANMORE GAS COMPANY. Nov. 15.
READING GAS COMPANY. Nov. 15.
SUNDERLAND AND SOUTH SHIELDS WATER COMPANY. Nov. 16.
TENDRING HUNDRED WATER COMPANY. Nov. 15.
WANDSWORTH AND PUTNEY GAS COMPANY. Nov. 29.
WORTHING GASLIGHT AND COKE COMPANY. Nov. 15.

### TENDERS FOR

### Brass Fittings and Compo. Pipe, &c.

WILMSLOW AND ALDERLEY EDGE GAS COMPANY. Tenders by Nov. 22.

### Fire Clay Goods.

BURTON-ON-TRENT. Tenders by Nov. 28.
CHORLEY GAS DEPARTMENT. Tenders by Nov. 15.
LEEDS GAS DEPARTMENT. Tenders by Nov. 19.

### Pipes and Fittings.

CHORLEY GAS DEPARTMENT. Tenders by Nov. 15.
WILMSLOW AND ALDERLEY EDGE GAS COMPANY. Tenders by Nov. 22.

### Tar and Ammoniacal Liquor.

HECKMONDWIKE GAS COMPANY. Tenders by Nov.

### Washer-Scrubber.

HINDLEY GAS DEPARTMENT. Tenders by Nov. 10.


## BOOKS AND LEAFLETS

TO BE OBTAINED OF

WALTER KING,

11, BOLT COURT, FLEET STREET, E.C.

GAS, OIL, AND AIR ENGINES.—By (the late) BRYAN DONKIN. *Price* 25*s.*

METHODS OF GAS ANALYSIS.—By Dr. WALTHER HEMPEL. Translated from the third German edition and considerably enlarged by L. M. DENNIS. *Price* 10*s.*

THE SCIENCE AND PRACTICE OF LIGHTING AS APPLIED TO STREETS, OPEN SPACES, AND INTERIORS.—By W. H. Y. WEBBER. *Price* 3*s.* 6*d.*

PUBLIC LIGHTING BY GAS AND ELECTRICITY.—By W. J. DIBDIN, F.I.C.,F.C.S. *Price* 21*s.*

HANDBOOK OF PRACTICAL GAS-FITTING.—By W. GRAFTON. *Price* 5*s.*

A LEAFLET ON SULPHATE OF AMMONIA: ITS SOURCE; RELATIONSHIP TO SOIL; EFFECT ON PLANTS.—By H. H. COUSINS, M.A., South-Eastern Agricultural College, Wye. *Price* 7*s.* 6*d. per* 100; £3 *per* 1000.

*Other Books supplied (Post Free) at Published Prices.*


## NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.*

**COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.**

**Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.**

**Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.**

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
**Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.**


**OXIDE OF IRON.**

**O'NEILL'S OXIDE has a larger annual** sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

**WINKELMANN'S**
**"VOLCANIC" FIRE CEMENT.**
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

**SULPHURIC ACID for Sale, specially** suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

**J. & J. BRADDOCK (Branch of Meters** Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

**DUTCH OXIDE OF IRON.**

**THE First Dutch Bog Ore Co., Ltd.,** (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.
*General Manager (for England and Wales)*—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
*London Managers*—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
*General Manager (for Scotland)*—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

**OXIDE OF IRON.**
**(NATURAL.)**

**BALE & CHURCH will be pleased to** send Samples and Quotations, and make Offers for SPENT OXIDE.

BALE'S FIRE CEMENT, PAINT, AND GAS COAL.
5, CROOKED LANE, LONDON, E.C.

**SULPHURIC ACID.**

**SPECIALLY prepared for the Manu**facture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

**GAS EXHIBITION.** Comfortable Homelike Hotel (not licensed), Central. Will Managers and Secretaries send for Tariff? Mrs. GARRARD, 53, Hunter St., BRUNSWICK SQUARE, W.C.

HYDRATED OXIDE OF IRON.

**PREPARED from Pure Iron.**
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

TO GAS AND WATER OFFICIALS.

**MELROSE CYCLES and Slot Copper** COLLECTORS. Latest Design and lowest Prices. For Cash or gradual payments. Catalogue free.
MELROSE CYCLE COMPANY, COVENTRY.

**GAS TAR wanted.**
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

**SULPHATE OF AMMONIA** SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
See our exhibit at the International Gas Exhibition, Earl's Court, Nov. 19 to Dec. 17.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

**COAL GAS TAR wanted.**
BEST PRICES GIVEN.
SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

**AMMONIACAL LIQUOR wanted.**
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

THE KEITH LIGHT.

OVER 1600 INSTALLATIONS IN DAILY USE.
**SEE illustrated advertisement in next** week's issue.
JAMES KEITH AND BLACKMAN, Co, LTD., 27, Farringdon Avenue, LONDON, E.C.

"NUGEPE" CEMENT.

**JOHN E. WILLIAMS AND CO.,**
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

**AMMONIACAL Liquor wanted by** JOHN RILEY & SONS, Hapton, near ACCRINGTON.

**PATENTS AND TRADE MARKS** PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

**BROTHERTON & CO., LIMITED.**
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

PENNY-IN-THE-SLOT WORK.

**H. GREENE & SONS, Ltd., are pre-** pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

SPENT OXIDE.

**THE South Metropolitan Gas Company** are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

**GAS LIQUOR WANTED.**
Particulars to MAJOR AND COMPANY, LIMITED, HULL.

**GAS and Water Works Supplies and** Construction Company, Limited, Constructors for all Gas and Water Work and Main Laying. All Gas and Water Works Plant and Fittings supplied. Gas and Water Works Financed. Shares and Stock accepted in part payment for Work and Materials supplied. Gas and Water Works Shares and Stock Underwritten and Issued.
LONDON OFFICE, 99, CANNON STREET, E.C.

**DISENGAGED shortly, an energetic** young Gas Engineer, well Trained and possessing Practical knowledge of up-to-date Plant, including De Brouwer, is open to accept engagement as an Assistant in moderate-sized or large Gas-Works. First-class Honours Gas Manufacture (London City and Guilds), Chemistry, &c. Unexceptionable References.
Address, R. G., 28, Great George Street, Westminster, LONDON.

**ROBERT DEMPSTER & SONS, Ltd.,** Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

**GAS EXHIBITION—Advertiser, a** young French Lady, speaking English perfectly and having Experience in Exhibitions, requires Post as Attendant.
Address No. 4283, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**ENGINEER and Manager of a medium-** sized Gas-Works seeks re-engagement as above. Thoroughly understands the whole routine of a Gas-Works; also the Working and Construction of Generator and Regenerative Furnaces. Testimonials as to ability can be produced.
Address No. 4284, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**GAS Fitters—Wanted, First-Class Men** with undeniable References for Barrel and Compo. Immediate employment.
Apply to THE RICHMOND GAS STOVE AND METER COMPANY, LIMITED, Stratford, ESSEX.

**WANTED, immediately, a Leading** Stoker, used to Shovel Charging and Regenerative Retorts. Wages 35s. weekly, with one week's Holiday per year. Permanency to suitable man.
Apply, with Reference, to the MANAGER, Gas-Works, SUNBURY-ON-THAMES.

**WANTED, by a large Suburban Gas** Company, a DRAUGHTSMAN well up in Gas-Works Construction.
Apply, by letter, giving details of Experience, &c., and *copies* of Testimonials, to No. 4291, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXHIBITION ATTENDANT.

**WANTED, a qualified Man with ex-** perience in Gas Trade for Earl's Court Exhibition, Nov. 19 to Dec. 17.
Apply, by letter, with full Particulars, to No. 4290, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, at once, for a small Gas-** Works in Mid Wales (make about 2 millions), a reliable All-Round Man, of good character, to take entire Charge. Wages could be contracted for to cover extra labour if necessary.
Applicants should state Age, and enclose *copies* of Two recent Testimonials, to No. 4289, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, a Man thoroughly Expe-** rienced in the Use and Management of Inclined Retorts, Cyanogen and Naphthalene Extraction Processes, &c., to Take Charge of Works in America. Good position to right party. Man must be active and energetic.
Address, stating Age, Experience, References, and Salary expected, to No. 4287, care of Mr. King, 11, Bolt Court, Fleet Street, LONDON, E.C.

**WANTED, immediately, Two good Gas-** FITTERS experienced in fixing Gas Fires, Cookers, Incandescent Burners, and all kinds of Internal and External Gas-Fitting. None but Men who have had experience under a Gas Company need apply. Wages about 7d. per hour, according to ability. Permanent work to suitable Men.
Applications, with *copies* of Testimonials, to be addressed to ALEX. A. JOHNSTON, Manager, Gas-Works, ILFORD.

STOCKPORT CORPORATION.
(GAS DEPARTMENT.)

**WANTED, a Foreman for Retort-** House of a capacity of 3 Million cubic feet per day; Horizontals and Inclines, Regenerative Fires. Knowledge of Stoking Machinery, Carburetted Water Gas, &c., preferred. Eight-hour Shifts. One day per Month holiday. Wages 45s.
Applications in own hand-writing, and by letter only, stating full Particulars of Experience and References, to be sent in to the Engineer not later than Nov. 16.

**WANTED, for the Distribution De-** partment of a Gas Undertaking in the Midlands, a Capable, Energetic, and Experienced Man. Age not over 40.
Applicants must have had considerable Experience in Main and Service Laying, Meter and Stove Fixing, be fully conversant with Gas Engines and Producers, and the Construction and Maintenance of all modern forms and Types of Incandescent Lighting, and be accustomed to the Control of large numbers of men. They must also have had a good Technical Education, and be capable of the administration of the Department under the Chief Engineer. A knowledge of Electricity would be an advantage.
Salary offered £200 per annum, with immediate prospects of considerable advance if satisfactory.
Applications (which will be treated in confidence), giving Qualifications, Age, Experience, Particulars of Technical Certificates held, and *copies* only of not more than Four recent Testimonials, to be sent to No. 4286, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C., not later than the 14th inst.

**GAS PLANT for Sale—I can always offer** NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

**NEW Gasholder, 40 ft. diameter by** 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.
Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

**"DEMPSTER'S" Direct-Acting Re-** ciprocating Pumps, Exhausters, and Steam-Engine Combined. Two Sets, 8-inch and 12-inch Connections. Overhauled and Guaranteed. Cheap. Room wanted.
FIRTH BLAKELEY & Co., Gas Engineers, DEWSBURY.

**THE Frome Gas Company have for dis-** posal the following Second-Hand Plant, which has been removed to make room for larger.
Two Table ENGINES, 6½-inch Cylinders by 12-inch Stroke.
One 16-inch EXHAUSTER (10,000 feet per hour).
One 8-inch FOUR-WAY BYE-PASS VALVE.
Three 8-inch SLIDE VALVES.
One 8-inch S. A. BYE-PASS VALVE.
Prices and all Particulars on application to the Manager, Mr. H. F. VINCENT, at the Gas-Works, FROME.

TO WATER-WORKS MANAGERS AND OTHERS.

**FOR SALE—A Horizontal Condensing** PUMPING-ENGINE, steaming at about 60 lbs., with jacketted Cylinder and Well and High Lift Pumps complete, capable of raising water from a well of 100 feet in depth, and raising the same 250 feet above ground level at the rate of 35,000 gallons per hour.
The Engine is in thorough working order, and may be seen at any time during the next four weeks, after which it will be dismantled to make room for a larger engine.
The price, as it stands, complete, £400.
Apply to Messrs. JOHN TAYLOR, SONS, and SANTO CRIMP, Civil Engineers, 27, Great George Street, WESTMINSTER, from whom full Particulars may be obtained.

HINDLEY URBAN DISTRICT COUNCIL.

**THE Gas Committee of the above** Council are prepared to receive TENDERS for a WASHER-SCRUBBER of the capacity of about 30,000 cubic feet per hour. Drawings and Specification to accompany each Tender.
Sealed Tenders, endorsed "Washer-Scubber," to be sent in to the undersigned not later than Thursday, Nov. 10, 1904.
The lowest or any Tender not necessarily accepted.
H. O. TIMMINS,
Engineer.
Cross Street, Hindley, Nov. 1, 1904.

HECKMONDWIKE GAS COMPANY.

**THE Directors of the above Company** invite TENDERS for the purchase of surplus TAR and AMMONIACAL LIQUOR produced at their Works during the Twelve Months ending Dec. 31, 1905.
Particulars and Conditions of Contract may be obtained from the Manager, Mr. F. D. Richmond.
Tenders, endorsed "Tar and Liquor," to be addressed to the Chairman, Mr. J. J. Stead, and sent in not later than Nov. 17, 1904.
The Directors do not bind themselves to accept the highest or any Tender.
By order,
E. BENN, Secretary.

WILMSLOW AND ALDERLEY EDGE GAS COMPANY.

**THE Directors of the above Company** invite TENDERS for the supply of WROUGHT-IRON TUBES and FITTINGS, COMPO. and LEAD PIPE, and BRASS FITTINGS required during the ensuing Twelve Months.
Sealed Tenders, endorsed "Fittings," to be addressed to Mr. W. H. Welsh, Secretary, 52, Brown Street, Manchester, and delivered not later than Tuesday, the 22nd of November, 1904.
Forms of Tender and any other Information may be had from the undersigned.
WM. SEVERS,
Engineer and Manager.
Gas-Works, Wilmslow,
Nov. 5, 1904.

BOROUGH OF CHORLEY.
(GAS DEPARTMENT.)

**THE Corporation are prepared to re-** ceive TENDERS for the supply and delivery of the necessary RETORTS and FIRE-BRICKS required at their Gas-Works; and also for the supply of 100 CAST-IRON PIPES, 3-inches diameter.
Forms of Tender and any other Information can be obtained from Mr. J. W. Allin, Gas Engineer, Chorley.
Tenders, endorsed "Retorts" or "Pipes," as the case may be, to be sent to me on or before Tuesday, the 15th inst.
The Corporation do not bind themselves to accept any Tender.
By order,
JNO. MILLS,
Town Clerk.
Town Hall, Chorley, Nov. 2, 1904.

BOROUGH OF BURTON-UPON-TRENT.

FIRE-CLAY GOODS.

**THE Gas and Electricity Committee** invite TENDERS for the supply of the FIRE-CLAY RETORTS, BRICKS, and CLAY required at the Gas-Works during the Year 1905.
Full Particulars of the Specification and Conditions with Form of Tender, may be obtained on application to the undersigned, to whom sealed Tenders, endorsed "Fire-Clay Goods," must be delivered on or before Monday, the 28th day of November current.
The lowest or any Tender will not necessarily be accepted.
F. L. RAMSDEN,
Manager and Engineer.
The Gas-Works,
Burton-upon-Trent,
Nov. 1, 1904.

### LEEDS CORPORATION GAS-WORKS.

**THE Gas Committee are prepared to receive** TENDERS for the supply of FIRE-CLAY RETORTS, FIRE-BRICKS, FIRE-BRICK LUMPS, and FIRE-CLAY.

Specification and Form of Tender may be had on application to the undersigned.

Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Fire Goods," must be delivered at the Gas Offices, East Parade, Leeds, not later than Saturday, the 19th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Gas Offices, East Parade,
Leeds, Nov. 5, 1904.

### ORIENTAL GAS COMPANY, LIMITED.

**NOTICE is Hereby Given, that an** ORDINARY GENERAL MEETING of this Company will be held at the Company's Office, Finsbury House, Blomfield Street, London, E.C., on Wednesday, the 16th day of November, 1904, at Twelve o'clock noon precisely, for the following purposes: To receive the Directors' Report and the Accounts of the Company for the Year ended the 30th of June, 1904, to declare a Dividend, and to elect Directors and Auditors in the place of those retiring.

The TRANSFER BOOKS WILL BE CLOSED from the 14th of November to the 3rd of December, both days inclusive.

By order of the Board,
H. J. LUFF, Secretary.

Finsbury House, Blomfield Street,
London, E.C., Nov. 7, 1904.

### IMPERIAL CONTINENTAL GAS ASSOCIATION.

(INCORPORATED BY ACT OF PARLIAMENT.)

**NOTICE is Hereby Given, that the Half-**YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, the 1st inst.—

JOHN HORSLEY PALMER, Esq., in the Chair,

when the following RESOLUTIONS were unanimously passed:—

"That the Report of the Directors upon the affairs of the Association be received, adopted, and entered upon the Minutes."

"That a Dividend of 5 per cent. for the Half Year ended June 30 last be declared upon the £3,800,000 Capital Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 8th of November inst."

Cordial Votes of Thanks were passed to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the Chair, and to the Staff in London and on the Continent.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
Nov. 2, 1904.

### GREAT YARMOUTH WATER-WORKS COMPANY.

INCORPORATED BY THE GREAT YARMOUTH WATER-WORKS ACT, 1853.

SALE BY TENDER OF 500 £10 NEW ORDINARY SHARES.

**THE Directors invite Tenders, at not** less than par value, for the purchase of 500 NEW ORDINARY £10 SHARES in the above-named Company. The Shares will be issued as fully-paid, and will constitute a portion of the Additional Capital authorized to be raised under the powers and provisions contained in the Great Yarmouth Water-Works Act, 1899.

These Shares rank for a Maximum Dividend of 7 per cent. per annum, and the Dividends on similar Shares have for the last 8½ Years been paid at the rate of 4 per cent. per annum.

Payment for the Shares is to be made as follows—viz., 10 per cent. on application, and the balance on or before the 24th of December, 1904.

The Dividends are paid half-yearly, and will accrue from the 24th of December next.

Particulars and Conditions of Issue, with Forms of Tender, may be obtained on application to the Secretary, to whom Tenders, marked "Tender for Shares," must be delivered on or before the 12th of November next.

By order of the Directors,
T. A. RISING,
Secretary.

3, South Quay, Great Yarmouth,
Oct. 17, 1904.

### READING GAS COMPANY.

SALE BY TENDER OF 4 PER CENT. PERPETUAL DEBENTURE STOCK.

**THE Directors of the Reading Gas** Company invite TENDERS for £3816 19s. 9d. 4 PER CENT. PERPETUAL DEBENTURE STOCK (including Premium) to be raised in pursuance of the powers of "The Reading Gas Act, 1902."

Sealed Tenders, on the Form provided, must be delivered at the Company's Central Offices, 7, King Street, Reading, not later than noon on Tuesday, the 15th of November, 1904.

The Stock will be allotted to the highest bidders.

The Purchase money for the Stock to be paid by the 30th of November, 1904.

By the Trustee Act, 1893, it is provided that a Trustee having power to invest in the Mortgages or Bonds of a Company, may, unless the contrary is expressed in the instrument authorizing the investment, invest in the Debenture Stock of such Company.

Particulars and Conditions of Sale and Forms of Tender may be obtained on application to the undersigned.

By order of the Directors,
A. CANNING WILLIAMS,
Secretary.

7, King Street, Reading,
Nov. 1, 1904.

### ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

**MR. ALFRED RICHARDS begs to** notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
**HARROW AND STANMORE GAS COMPANY.**

NEW ISSUE OF 300 £10 "C" SHARES.

**MR. ALFRED RICHARDS will Sell the** ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
**WORTHING GASLIGHT AND COKE COMPANY.**

NEW ISSUE OF 300 £10 ORDINARY SHARES.

**MR. ALFRED RICHARDS will Sell the** ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the
**ALDERSHOT GAS AND WATER COMPANY.**

NEW ISSUE OF 365 £10 FIVE PER CENT. "G" PREFERENCE SHARES AND 365 £10 "G" ORDINARY SHARES.

**MR. ALFRED RICHARDS will Sell the** ABOVE BY AUCTION, at the Mart., E.C., on Tuesday, Nov. 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
**TENDRING HUNDRED WATER-WORKS COMPANY**
(Supplying Harwich, Dovercourt, Walton-on-Naze, Frinton-on-Sea).

NEW ISSUE OF 500 £10 "A" SHARES.

**MR. ALFRED RICHARDS will Sell the** ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
**WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.**

NEW ISSUE OF £10,000 ORDINARY "C" STOCK, ranking for a Standard Dividend of 3½ per cent., subject to the Sliding-Scale, the last Dividend on the Company's existing "C" Stock having been at the rate of £5 8s. 6d. per cent. per annum.

**MR. ALFRED RICHARDS will Sell the** ABOVE BY AUCTION at the Mart, Tokenhouse Yard, E.C., on Tuesday, Nov. 29, at Two o'clock, in Lots of £100, £50, and £25 each.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

### SUNDERLAND AND SOUTH SHIELDS WATER COMPANY.

IMPORTANT SALE OF WATER STOCK.

**TO BE SOLD by Auction, in the Long** Room of the Queen's Hotel, Fawcett Street, Sunderland, on Wednesday, the 16th of November, 1904, at Three o'clock in the afternoon prompt,

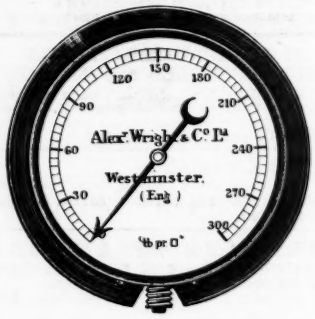
Mr. ATKINSON GIBSON, AUCTIONEER,

£20,000 (Nominal) of ADDITIONAL ORDINARY CAPITAL STOCK (maximum Dividend 5 per Cent.) authorized to be created and issued under the powers contained in the Sunderland and South Shields Water Act, 1891.

The above Stock will be entitled to Dividend from the 1st day of January, 1905, and be registered in the name of the Purchaser free of charge.

A Deposit of 10 per cent. will be required at the time of Sale; the remainder to be paid on or before the 20th day of December, 1904.

THE
"ROTARY"
STATION METER.
Efficiency
Demonstrated.
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE,
MANCHESTER.

STEAM, OIL, and WATER.


Any Range of Pressure.

*Now Ready, Price 15s., Limp Cloth.*
TWENTY-FOURTH YEAR.
AN
ANALYSIS OF THE ACCOUNTS
OF THE
METROPOLITAN WATER COMPANIES
(Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, and West Middlesex),
AND OF THE
ACCOUNTS OF SOME OF THE PRINCIPAL
PROVINCIAL WATER UNDERTAKINGS
FOR THE YEAR 1903-1904.
Compiled by
WOOD, DREW, & CO.,
Chartered Accountants.
LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for
METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
*Inquiries Solicited.*
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

WATERINE.
REGISTERED.

The most powerful and efficient but withal absolutely harmless Water Softener and Purifier.
*Descriptive Pamphlet and Prices on application to*
THE WILSON CHEMICAL CO.,
30/34, MINCING LANE, LONDON, E.C.

**TROTTER, HAINES, & CORBETT,** LIMITED,
**Brettell's Estate**
**FIRE-CLAY & BRICK WORKS,**
**STOURBRIDGE.**

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
**Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.**
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

**HEATHCOTE GAS COAL.**

**Rich in Illuminating Power and yield of Gas.**
**Above the Average in Weight and Quality of Coke.**
**Maintains a High Standard in Residuals.**

**THE GRASSMOOR CO., LD.,**
**CHESTERFIELD.**

**'BUFFALO' INJECTOR**

Operated Entirely by One Handle
Class A lifts 24 ft.
Class B lifts 12 ft.
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| **ROCHESTER** 2nd Order | 2 | ,, | 24 | × | 20 | × | 5 | 0 |
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| **CAGLIARI** | 4 | ,, | 10 | × | 10 | × | 4 | 0 |
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MAINTENANCE SIMPLIFIED.
Nothing to Corrode. Nothing to Choke.
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Patent No. 9747,
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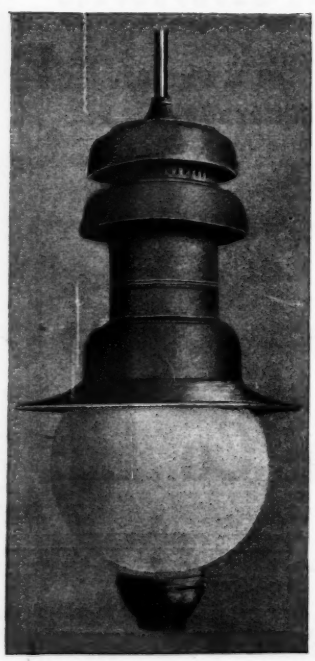
Lamp with Globe up ready for use.



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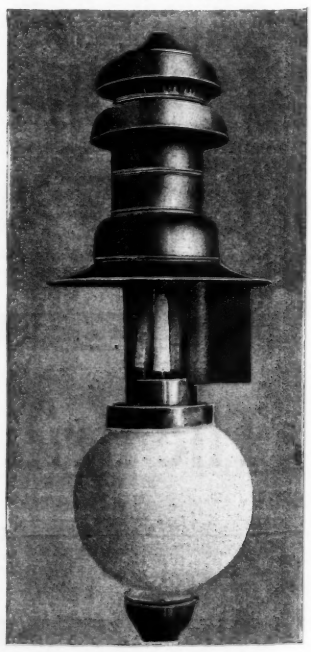
Globe lowered, showing wind-proof shield with door open for access to Mantles. Bottom cup can be removed for Globe cleaning.



# The Welsbach Kern (Patent)

# Self-Intensifying Lamps.

Length overall.
604a 2 ft. 8 in.
604b 3 ft. 3 in.
604c 4 ft. 2 in.

Width overall.
Reflectors.
Enamelled. Opal.
604a 16½ in. 18 in.
604b 22 in. 24 in.
604c 24 in. 26 in.

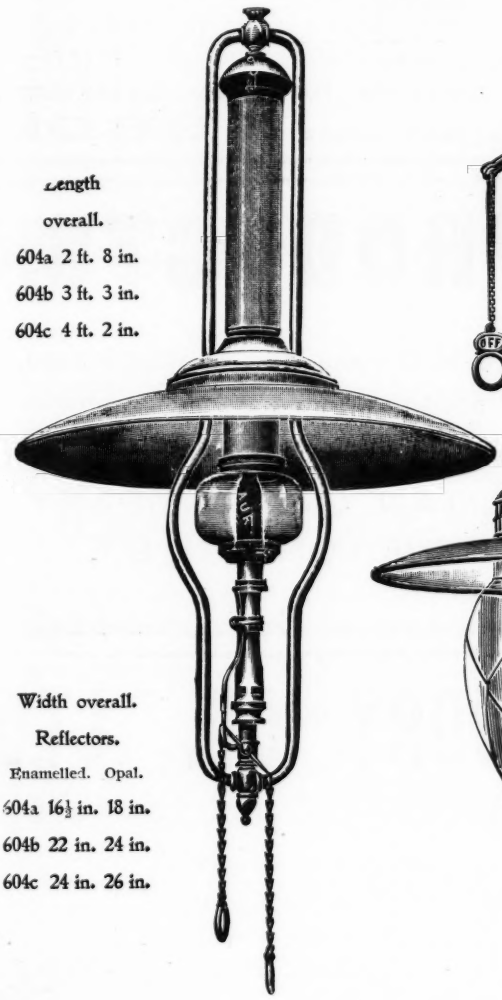


**Fig. 604.**

Interior Lighting. Enamelled.
A 5 ft. per hour, 150 c.p., £1 13 0
B 10 ft. „ 300 c.p., 2 8 0
C 20 ft. „ 600 c.p., 4 4 0

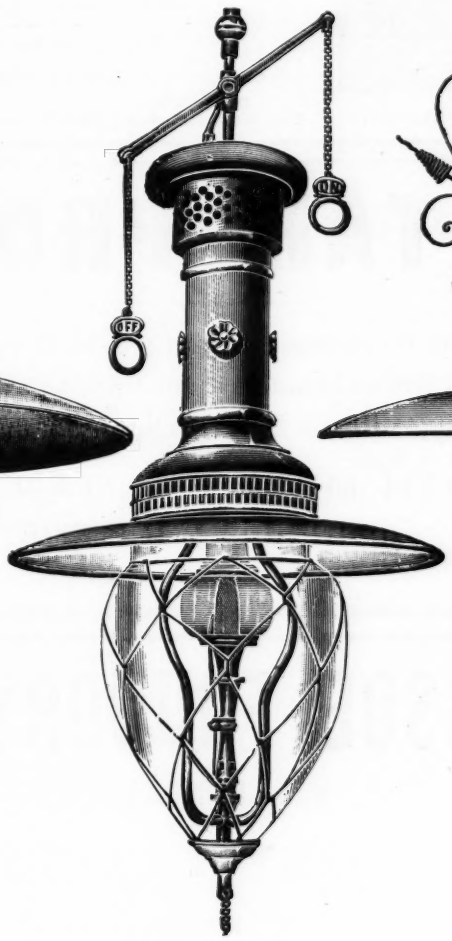


**Fig. 607.**

| Overall. | Length. | Width. |
|---|---|---|
| 607b | 4 ft. 4 in. | 24 in. |
| 607c | 5 ft. 0 in. | 29 in. |

Storm Proof Arc. Enamelled Reflector, Cup and Ball Joint, Lever Tap and By-pass.

607b 10 ft. per hour, 300 c p. £5 0 0
607c 20 ft. „ 600 c.p. 7 10 0

Length overall.
Same as sizes 604.

Width overall.
Same as sizes 604.

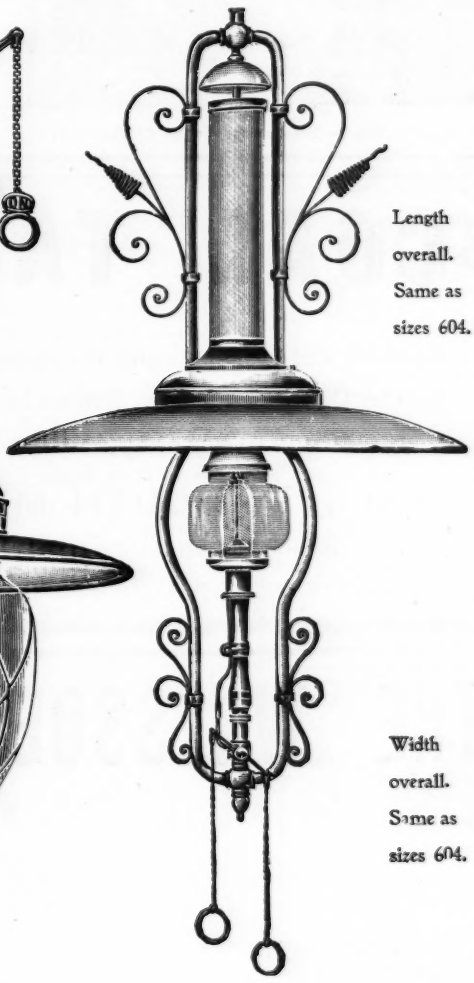


**Fig. 605.**

Interior Lighting (Ornamental).
605a 5 ft. per hour, 150 c.p , £2 5 0
605b 10 ft. „ 300 c.p., 3 1 6
605c 20 ft. „ 600 c.p., 5 0 0

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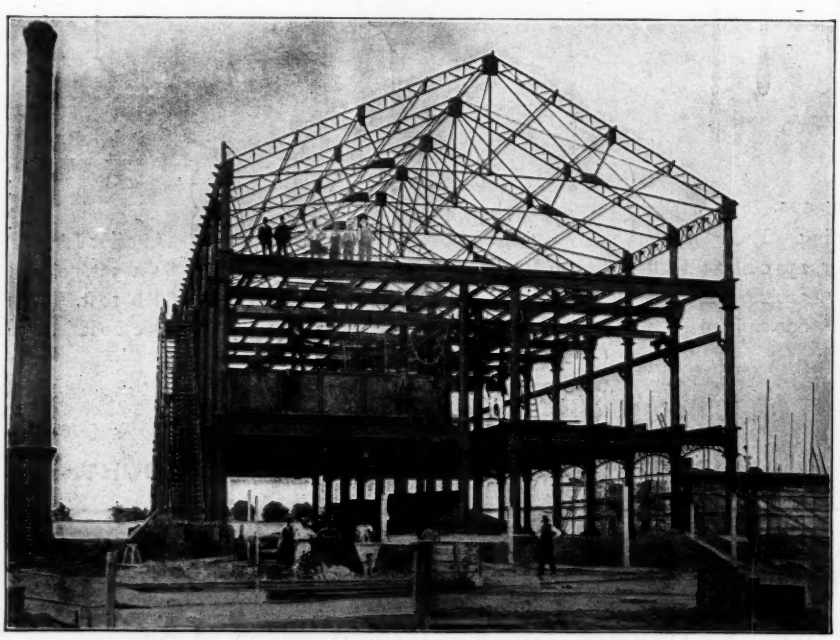

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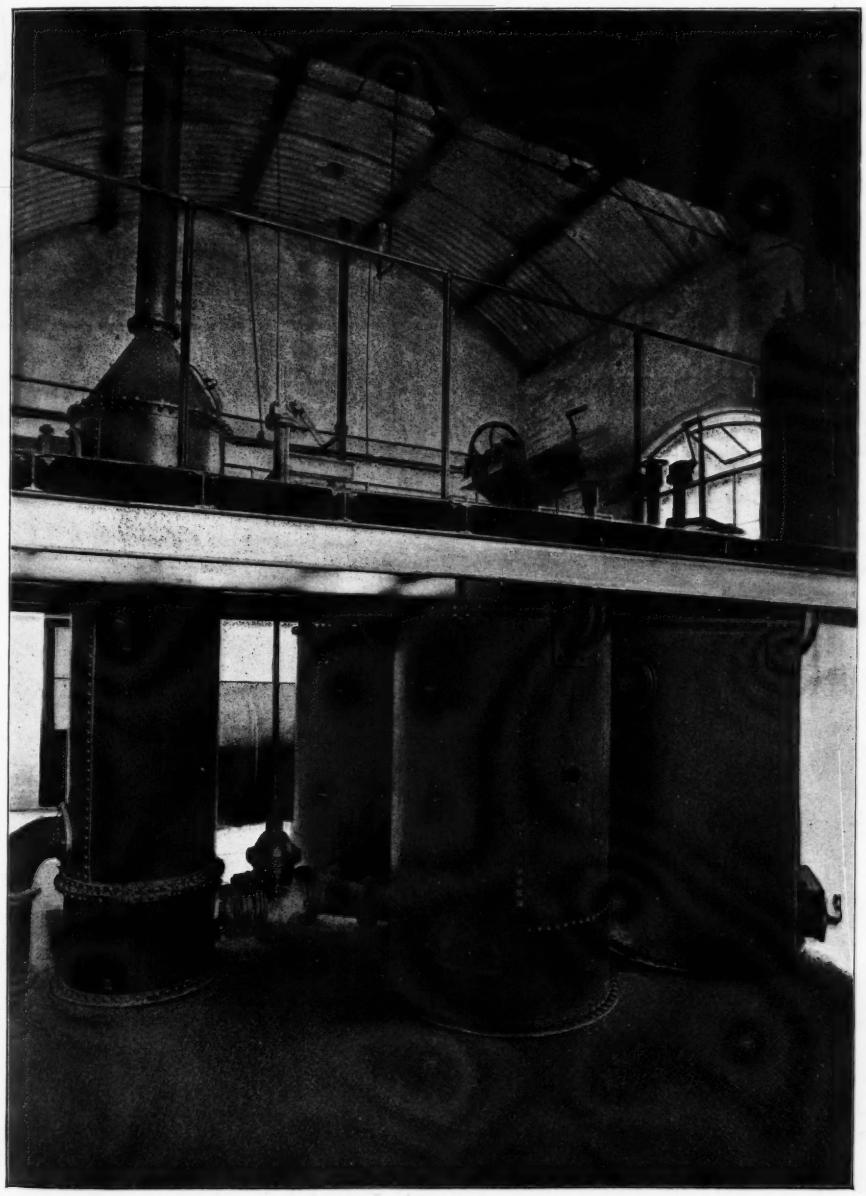

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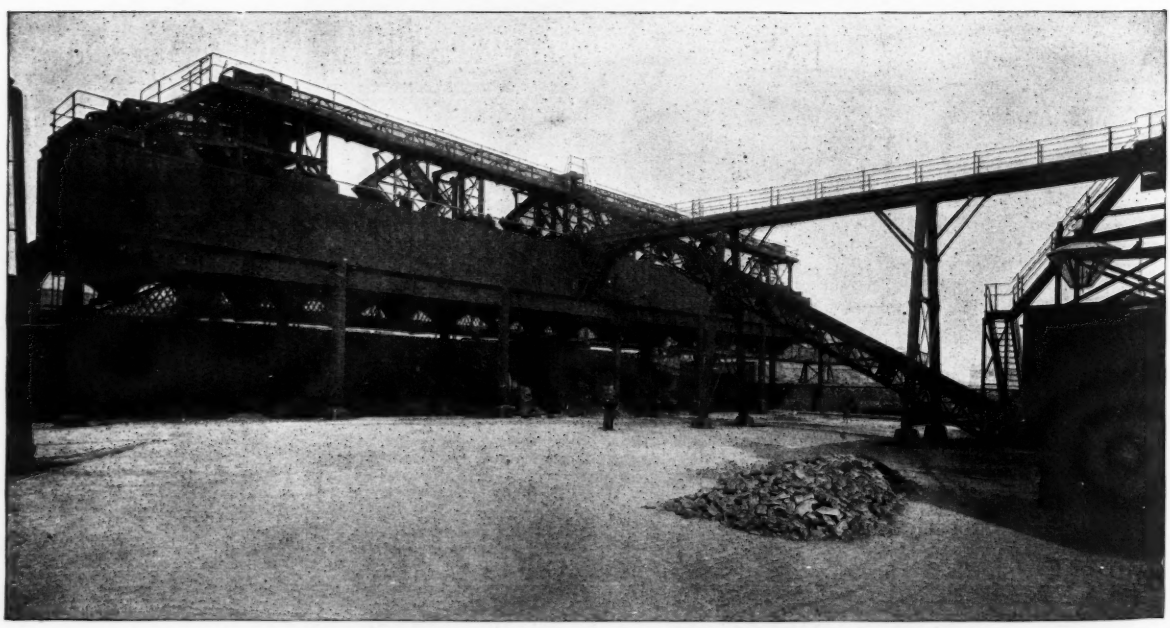

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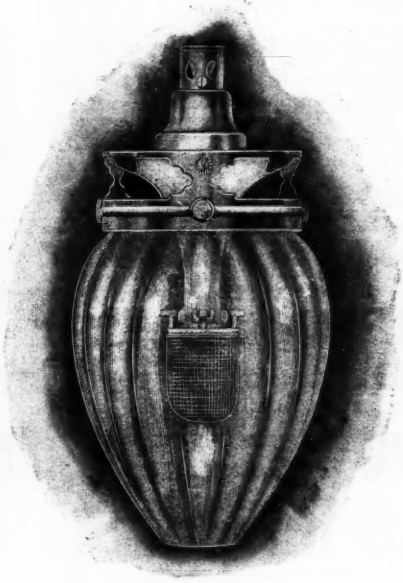

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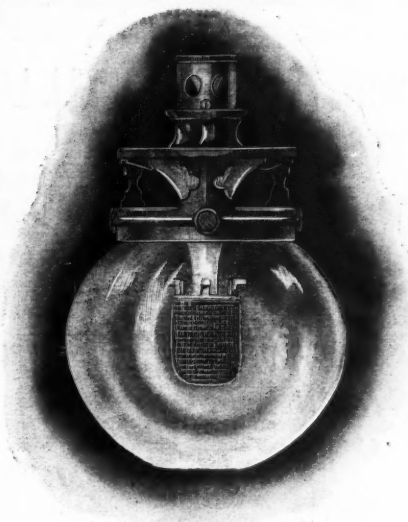

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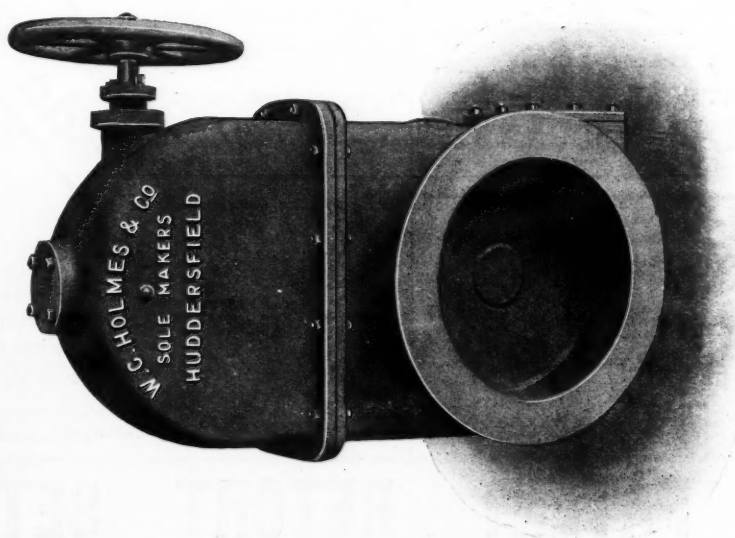


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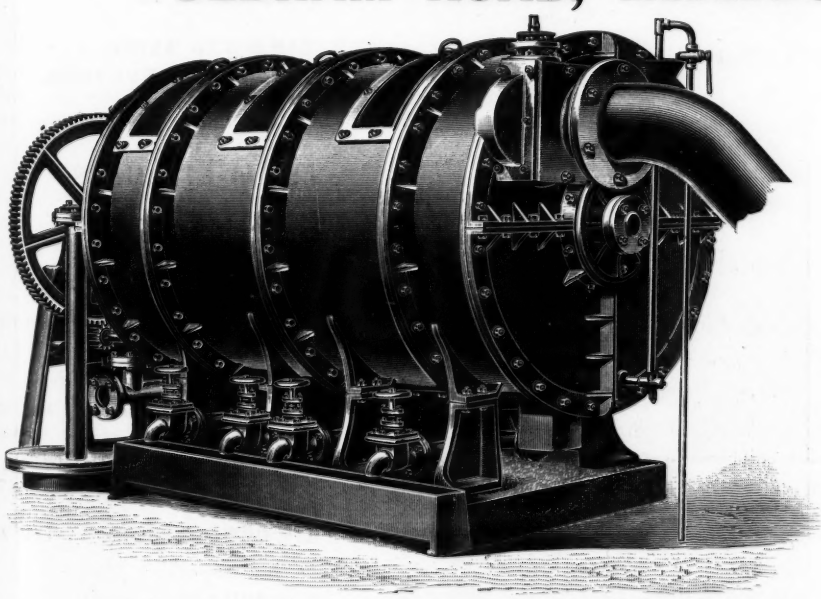

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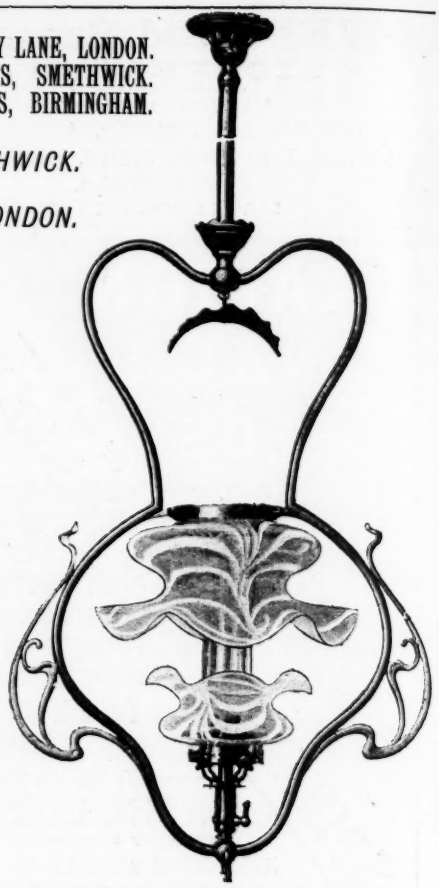

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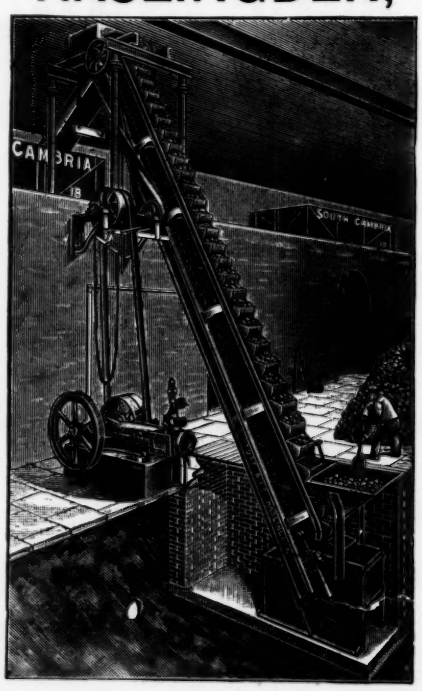


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